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SSC San Diego Command History Calendar Year 2005

SPAWAR Systems Center San Diego

SSC San Diego
San Diego, CA 92152-5001

PREFACE

The Space and Naval Warfare Systems Center San Diego (SSC San Diego), Command History for calendar year (CY) 2005 is submitted in conformance with OPNAVINST 5750.12H. The history provides a permanent record of CY 2005 activities at SSC San Diego. Although the history covers one calendar year, much of the information was only available on a fiscal year (FY) basis and is so noted in the text. In addition, some CY 2004 accomplishments were received too late for inclusion in the CY 2004 history and are included here; these are noted in the text.

This Command History is divided into three main sections. The first section is a general introduction to SSC San Diego. The second section describes administrative highlights. The third section documents technical highlights.

Appendices to this document provide supplementary SSC San Diego information. Appendix A lists achievement awards given in CY 2005. Appendix B lists patents awarded in CY 2005. Appendices C and D provide lists of distinguished visitors hosted by SSC San Diego and major conferences and meetings at SSC San Diego, respectively. Appendix E lists acronyms used in the document.

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SECTION 1
INTRODUCTION

INTRODUCTION TO SSC SAN DIEGO

The Space and Naval Warfare Systems Center San Diego (SSC San Diego), is a full-spectrum research, development, test and evaluation, engineering and fleet support center serving the U.S. Navy, Marine Corps, and other Department of Defense and national sponsors within its mission, leadership assignments, and prescribed functions. SSC San Diego reports directly to the Commander, Space and Naval Warfare Systems Command (SPAWAR).

MISSION

SSC San Diego's formal mission is "to be the Navy's full-spectrum research, development, test and evaluation, engineering and fleet support center for command, control and communication systems and ocean surveillance and the integration of those systems which overarch multiplatforms."

LEADERSHIP AND TECHNOLOGY AREAS

Consistent with its mission, eight leadership areas are formally assigned to SSC San Diego. These leadership areas represent SSC San Diego's command, control, communications, computers, intelligence, surveillance, and reconnaissance (C^4ISR) charter and its leadership areas outside that scope—ocean engineering and marine mammals. Beyond these areas, SSC San Diego has demonstrated national and international expertise in a broad range of technology areas.

ASSIGNED LEADERSHIP AREAS

- Command, control, and communication (C^3) systems
- Command, control, and communication systems countermeasures
- Ocean surveillance systems
- Command, control, and communication modeling and analysis
- Ocean engineering
- Navigation systems and techniques
- Marine mammals
- Integration of space communication and surveillance systems

TECHNOLOGY AREAS

- Ocean and littoral surveillance
- Microelectronics
- Communications and networking
- Topside design/antennas
- Command systems
- Computer technology
- Navigation and aircraft C^3
- Intelligence/surveillance/reconnaissance sensors
- Atmospheric effects assessment
- Marine mammals
- Environmental quality technology/assessment
- Robotics

VISION

SSC San Diego's vision is "to be the nation's pre-eminent provider of integrated C^{4}ISR solutions for warfighter decision superiority." SSC San Diego's vision guides the Center's efforts in defining, developing, integrating, installing, and sustaining C^{4}ISR systems.

PROGRAMS

SSC San Diego conducts a broad range of programs that focus on integrated C^{4}ISR. The Center also conducts several unique programs outside its primary C^{4}ISR focus: Environmental Quality Technology/ Assessment, Marine Resources, Marine Mammals, Ocean Engineering, and Robotics and Physical Security. Innovative research is encouraged through the In-House Laboratory Independent Research and Independent Applied Research programs.

ORGANIZATION

Figure 1 shows SSC San Diego's organization as of 31 December 2005.
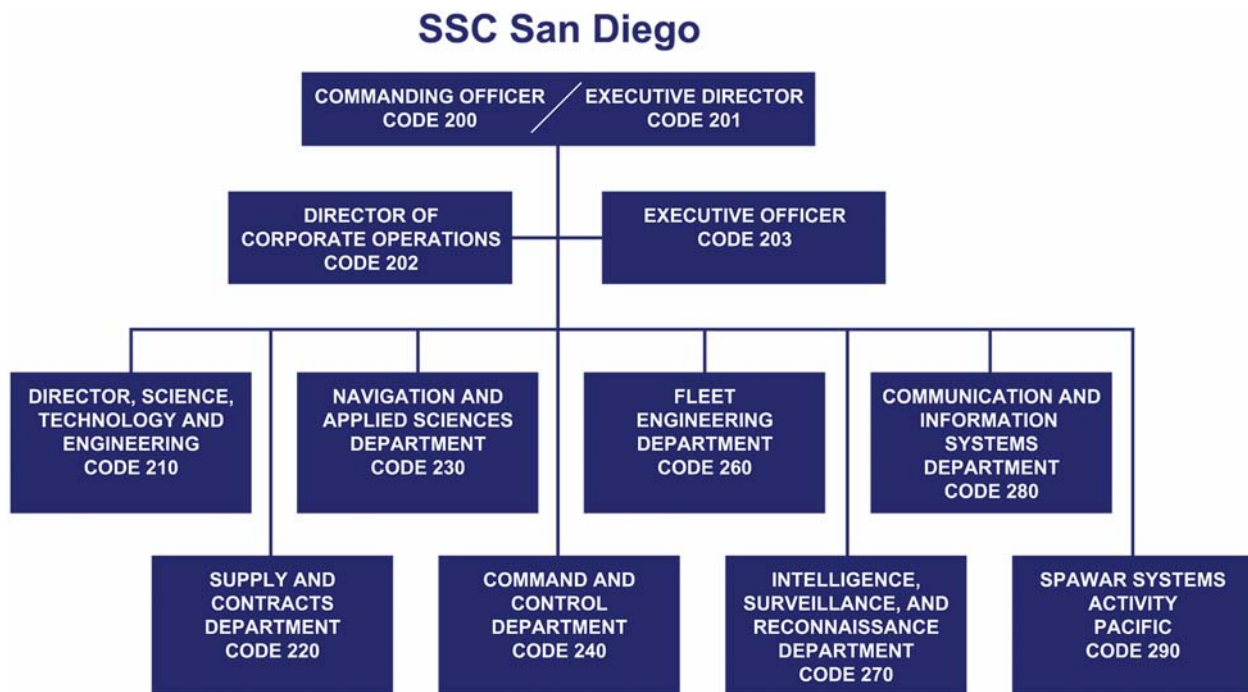
Figure 1. SSC San Diego organization.

SECTION 2
ADMINISTRATIVE
HIGHLIGHTS

FUNDING

Table 1 shows funding by sponsor in FY 2005.

Table 1. Funding by sponsor, FY 2005.

Sponsor	$M (% of Total)
Space and Naval Warfare Systems Command	505 (36.4)
Defense Advanced Research Projects Agency	145 (10.5)
Other Navy	270 (19.5)
Other (includes Army and Air Force)	217 (15.7)
Office of Naval Research	70 (5)
Naval Air Systems Command	83 (6)
Naval Sea Systems Command	96 (6.9)
Total	**1.386B**

PERSONNEL

PERSONNEL ONBOARD

Total personnel onboard for FY 2005 was 3736. Table 2 lists number of personnel by area.

Table 2. Personnel onboard, FY 2005.

Scientists and Engineers	1974
Technicians	402
Technical Specialists	602
Administrative	425
Clerical	235
Senior Executive Service	5
Wage Grade	13
Officers	49
Enlisted	31
Total	**3736**

MAJOR PERSONNEL CHANGES

Change of Command[1]

Capt. Frank Unetic

Capt. Frank Unetic assumed command of SSC San Diego from Capt. Tim Flynn on 18 August 2005. Capt. Unetic joined the Center from SPAWAR Headquarters where he was Executive Assistant to SPAWAR Commander Rear Adm. Ken Slaght. Prior to serving as Executive Assistant, Capt. Unetic was the SPAWAR program manager for submarine communications.

Rear Adm. Tim Flynn

Rear Adm. Tim Flynn served as SSC San Diego Commanding Officer beginning 2 May 2002. Before joining SSC San Diego, he was the Executive Assistant at SPAWAR Headquarters. He was nominated for the rank of rear admiral (lower half) as announced by Secretary of Defense Donald Rumsfeld on 1 April 2005.[*]

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[*] RDML Flynn's promotion was effective 1 February 2006.

Executive Director[2]

Carmela Keeney

Carmela Keeney was confirmed as SSC San Diego Executive Director on 7 December 2005. Keeney was selected as Executive Director on 5 July and had been acting Executive Director since that date. Prior to her selection as Executive Director, Keeney was head of the Intelligence, Surveillance, and Reconnaissance (ISR) Department[3] and the FORCEnet Technical Director for ISR and Information Operations. She replaced Executive Director Rod Smith, who joined SPAWAR as Deputy Commander.

Rod Smith[4]

SSC San Diego Executive Director Rod Smith was selected as SPAWAR Deputy Commander on 21 June 2005. Smith had been the Center's Executive Director and Acting Executive Director since the fall of 2003. Prior to serving as the Center's Executive Director, Smith was head of the Command and Control Department.

Director, Science, Technology and Engineering Department[5]

Director, Science, Technology and Engineering Department Head Gary Wang joined SSC San Diego in March 2005. Wang also serves as Chief Technology Officer for the SPAWAR Enterprise. In his previous assignment at SPAWAR, he was the acting program manager for Intelligence, Surveillance, and Reconnaissance and Information Operations.

BASE CLOSURE AND REALIGNMENT (BRAC) 2005[6]

Two organizations were realigned with SSC San Diego in BRAC 2005: Navy Center for Tactical Systems Interoperability (NCTSI) and San Diego Detachment of SSC Norfolk.

NCTSI

NCTSI provides standards management and certification testing of tactical data systems for the Navy and joint communities. It was initially an Echelon II Command, working directly for the Chief of Naval Operations, and transferred under Commander, Naval Network Warfare Command in August 2003.

SSC San Diego has a long history of developing the Tactical Digital Information Link family of systems, including the Command and Control Processor, the Common Data Link Management System, and Common Link Integration Processing. NCTSI has been the Navy's certification agent and interoperability consultant for all of these systems. Merging NCTSI into the Center will bring the specification testers, Tactical Digital Information Link certifying agent, and combined interoperability expertise under a single command. The merger is planned for initiation in FY 09.

SSC Norfolk Detachment San Diego

SSC Norfolk Detachment San Diego is currently one of the Center's partners in deploying critical network applications to the Fleet. The mission of SSC Norfolk Detachment San Diego is "to provide global cradle to grave software support and engineering for fleet standard automated information systems afloat and ashore." The Detachment builds, integrates, delivers, and supports information technology needed by combat forces and supporting shore infrastructure.

SSC Norfolk Detachment San Diego complements much of the network-related tasking performed at the Center, and the realignment will result in a streamlined installation process by integrating funding lines with hardware and software deliveries to naval forces.

STRATEGIC PLANNING AND INITIATIVES

FORCEnet ALIGNMENT[7]

To support the ongoing alignment of the SPAWAR claimancy to FORCEnet[8], three Center employees were selected for new deputy department head positions: (1) John Iaia, Command and Control Department, Code 240; (2) John Audia, Intelligence, Surveillance and Reconnaissance (ISR) Department, Code 270; and (3) Brian Marsh, Communication and Information Systems Department, Code 280.

In 2004, as a major component of the SPAWAR alignment, the heads of Codes 240, 270, and 280 were named FORCEnet Technical Directors for Command and Control; ISR; and Communications, Networks and Information Assurance, respectively. These three Technical Directors represent the major business areas in which SSC San Diego and SSC Charleston participate. A fourth Technical Director at SSC Norfolk represents the business information technology area. The Technical Directors of the four business areas are responsible for three essential elements of the alignment: work acceptance and assignment, technical authority, and corporate level execution.

The FORCEnet alignment effort entails major additional workloads at the Echelon II (SPAWAR) level for the three SSC San Diego department heads. The new deputy department head positions will help ensure efficient and effective management at the Echelon III (SSC San Diego) level, specifically in department, cross-department, and Center matters such as strategic planning and day-to-day technical and business management.

RDT&E BASELINE[9]

The SPAWAR Research, Development, Test and Evaluation (RDT&E) Working Group established the first baseline of all established RDT&E capabilities across SPAWAR and secured full approval of the baseline by the Level 2 Virtual Systems Command (Virtual SYSCOM). The team worked with counterpart teams from Naval Air Systems Command (NAVAIR) and Naval Sea Systems Command (NAVSEA) to establish the baseline.

The baseline provides a current portfolio of critical, established capabilities held by SPAWAR to support current readiness for the warfighter and for FORCEnet[10] experimentation. The capabilities are distinct and separate from the current legacy applications and networks, as well as the Navy/Marine Corps Intranet (NMCI) services, while concurrently directing the maximum use of NMCI.

The SPAWAR baseline, when combined with the NAVAIR and NAVSEA baselines, gives the Virtual SYSCOM an unprecedented understanding of the RDT&E capabilities across all three commands, as well as opportunities to maximize the use of NMCI.

In accordance with six essential governance criteria (agreed upon by SPAWAR, NAVAIR, and NAVSEA), 193 candidate RDT&E capabilities were reviewed and approved at each leadership level, from the Systems Centers to the SPAWAR Senior Steering Board. The capabilities were aligned to four domains: command and control, C^4ISR, ISR, and business information technology.

The team contributed a unique category of RDT&E capability, the stand-alone RDT&E capability, that was adopted across the Virtual SYSCOM. Thirty of the 193 candidate capabilities were segregated as being fully capable of performing the warfighter support mission with information technology services provided exclusively by NMCI. The team recommended and defended 161 candidate capabilities as fully complying with the six governance criteria. These were subsequently approved and formally baselined at the Virtual SYSCOM Level 2 meeting.

The team then directed its efforts to fully document and approve SPAWAR's RDT&E capabilities, creating a "product inventory." The product inventory withstood scrutiny in open peer review by NAVAIR and NAVSEA executives and technical representatives, and were approved and baselined at the Virtual SYSCOM review.

The RDT&E Working Group inventory product is the first "deliverable" presented to the Virtual SYSCOM that represents the complete set of RDT&E capabilities across the three SYSCOMs. It opens the door to the increased cross-Navy teaming needed to rapidly develop or test new capabilities for the warfighter using capabilities currently in place.

NEW PROJECT MANAGEMENT POLICY AND GUIDE[11]

Center management approved the new Project Management Policy and Project Management Guide (PMG) developed by the Center's Project Management Council (PMC) with the aid of the Systems Engineering Process Office.

The Project Management Policy requires that all Center projects follow the best practices as detailed in the Center's PMG. The purpose of the PMG is to help ensure that all of the Center's projects are managed and executed at the highest level of efficiency and effectiveness. The implementation of the PMG is supported through a training curriculum that includes a 3-day core course detailing the best practices in the PMG.

The PMC was established in 2003 by former SSC San Diego Executive Director Dr. Bob Kolb. The PMC is chartered to develop appropriate project management practices, tools, improvements, and guidance for implementation on SSC San Diego projects.

COMMUNITY OUTREACH

SECOND ANNUAL TECHNOLOGY DAYS[12]

SSC San Diego hosted the Office of Naval Research (Global) Science Advisors for the second annual SSC San Diego Technology Days. The Science, Technology, and Engineering Department coordinated the event. SSC San Diego technical codes provided 3 days of briefings and demonstrations of maturing technologies for the attendees. Topics included the following:

- Composeable FORCEnet[13]
- Dynamic Link-16 Networking
- Information Operations Center of the Future
- Naval Fires and Coalition Common Operational Picture
- Expeditionary Tactical Communications System
- Platform Engineering
- High Assurance Internet Protocol Encryptor
- Joint Tactical Radio System
- Satellite communications
- Swimmer detection systems
- Bathymetric Navigation System
- Navy Marine Mammal Systems

SSC San Diego has been the only Navy warfighting Lab to host the Science Advisors for an event of this type.

EIGHTH INTERNATIONAL AUTONOMOUS UNDERWATER VEHICLE COMPETITION[14]

The Eighth International Autonomous Underwater Vehicle Competition was held 3–7 August at the Center's Transducer Evaluation Center pool. The competition featured 19 teams that included one high school, universities from the U.S. and Canada, and a team from India. Each student team designed and built an autonomous underwater vehicle specifically for this competition.

The four winning teams divided $20,000 in scholarship money. The University of Florida Gators took first place, followed by Ecole de Technologie Superieure (Montreal) in second place, the Massachusetts Institute of Technology in third, and Duke University in fourth.

The Office of Naval Research and the Association for Unmanned Vehicle Systems International (AUVSI) sponsored the event. AUVSI is the world's largest nonprofit organization devoted exclusively to advancing the unmanned systems community. In addition to SSC San Diego, the Naval Undersea Warfare Division, Newport, and other entities from industry and academia provided support. The Center's Marine Systems Branch planned and coordinated the event.

2005 HIGH TECH FAIR[15]

In February, SSC San Diego demonstrated robotics technology from the Adaptive Systems Branch to middle school and high school students at the San Diego High Tech Fair. Students were given a hands-on demonstration of military robots and provided information about career opportunities in the robotics field and at the Center.

The High Tech Fair is a collaborative effort of the San Diego congressional delegation, the San Diego County Office of Education, the San Diego City Schools, and the San Diego Science Alliance. The goal of the High Tech Fair is to encourage young people to pursue studies in math and science. The fair has grown over the past 7 years to include 50 exhibitors and 2,500 students.

SUMMER INTERN PROGRAM[16]

The Communication and Information Systems Department hosted three interns during summer 2005. The program, established between SSC San Diego and Southwestern Community College, gives science and engineering students at the community college level an opportunity to participate in research and development work conducted at the Center. The program is intended to foster a closer relationship with the community and mentor community college students to encourage them to pursue science and engineering at a 4-yr college.

SECTION 3
TECHNICAL HIGHLIGHTS

NAVIGATION AND APPLIED SCIENCES

AIRBORNE FORCEnet (AFn)[17]

In 2005, the first prototype AFn installation was successfully flown and tested on an EP-3E. The prototype validated the system's ability to provide 128 kB of bandwidth and real-time connectivity through worldwide Navy communications facilities via the International Marine/Maritime Satellite.

SSC San Diego's AFn Integrated Product Team (IPT) is bringing a worldwide, wideband FORCEnet[18] capability to aviation platforms via the Internet Protocol (IP) for Secret Internet Protocol Router Network, Non-Secure Internet Protocol Router Network, and Joint Worldwide Intelligence Communication Systems. IP connectivity is a critical component of FORCEnet. Air platforms have been the last to converge C^4ISR systems, tap into the Global Information Grid, and implement FORCEnet. The system developed by the Center's team makes joint force collaboration possible by providing a conduit to collect, process, and share information in a fully integrated and networked environment.

During Phase I of the AFn effort, the team is enabling FORCEnet capabilities on the carrier-based E-2C Hawkeye in addition to the EP-3E. During Phase II, the team expects to export the same FORCEnet IP connectivity direct-to-sensor, including platforms such as the F/A-18 Hornet and the Navy's Broad Area Maritime Surveillance Unmanned Air Vehicle. Phase III will involve a future transition point, or migration path, for this product to seamlessly operate with the Joint Tactical Radio System, satellite communications, the Wideband Network Waveform, and the Navy's Wideband Gap-Filler.

SSC San Diego, through the AFn IPT, is contributing to the Office of Naval Research rapid technology transition effort to consolidate current technologies and provide air platforms with a commercial off-the-shelf program of record product configuration. The AFn IPT is providing an accelerated solution to the Fleet and a strategically resilient product that will be available and officially endorsed as a program of record.

NAVY MARINE MAMMAL PROGRAM (NMMP) SUPPORT FOR HURRICANE KATRINA RECOVERY OPERATIONS[19]

The NMMP provided support for Hurricane Katrina recovery operations involving eight aquarium dolphins. Hurricane Katrina's storm surge flooded an aquarium in Gulfport, Mississippi, washing eight aquarium dolphins into the Gulf of Mexico. The Southeast Regional Marine Mammal Stranding Coordinator for the National Oceanographic and Atmospheric Agency (NOAA Fisheries) was tasked to organize and lead a rescue effort. On 11 September 2005, the NMMP was asked to assist with transportation of the dolphins, when rescued, to a marine park in Florida.

To avoid moving the animals prior to a health assessment, the NMMP proposed a temporary solution: house the rescued dolphins in NMMP shipboard forward deployment (SFD) training pools until their health status could be determined. With concurrence of NOAA Fisheries and the acquisition manager (Program Executive Office, Littoral and Mine Warfare/Program Manager, Explosive Ordnance Disposal), the NMMP made arrangements with the Naval Construction Battalion Center, Gulfport, to set up SFD training pools and deployable water treatment support equipment for rehabilitation. Equipment was transported from San Diego to Gulfport; five NMMP personnel ensured that the equipment was operational by 17 September, in time to receive the rescued dolphins. Follow-on operations and planning included ongoing maintenance of the SFD systems, animal care, and transportation of the dolphins to other locations.

INTERACTIVE MULTISENSOR ANALYSIS TRAINING (IMAT)[20, 21]

Note: Accomplishments described here occurred in CY 2004 and CY 2005.

Throughout 2004 and 2005, the IMAT team worked with the Composeable FORCEnet[22] team at the Center to develop and demonstrate new approaches to collaborative command and control in antisubmarine warfare (ASW). The Center Team Achievement Award was presented to the Theater ASW/Composeable FORCEnet team for successfully fielding the first operational installation at Commander Task Force 74.

IMAT is central to the Commander, U.S. Pacific Fleet plan to reinvigorate ASW superiority in the Pacific Fleet. IMAT fleet training teams have been established to provide responsive training to deploying units and battle command staffs. In 2004, the IMAT team supported Fleet ASW Command, Afloat Training Group, Commander Naval Surface Group Middle Pacific; Command Task Force-12; and all deploying strike groups.

Working with the Applied Research Laboratory at the University of Texas, the IMAT program has also developed the Advanced Acoustic Analysis Adjunct for IMAT, a new visualization system for active sonar employment. The system was successfully demonstrated on 9 July 2004.

The IMAT program was praised by Commander, Pacific Fleet on 26 May 2005 for the Composeable FORCEnet installation on USS *Blue Ridge* (LCC 19) and USS *Kitty Hawk* (CV 63). The installations provided a major improvement in the ASW warfighting capability of the ASW command elements on both ships and was completed in time to be employed during the distributed ASW wargame held 2–6 May 2005. These shipboard installations were the first of their kind.

For additional background on the IMAT program, see referenced *Outlook* article.

JOINT INTERAGENCY TASK FORCE SOUTH (JIATF SOUTH)[23]

The Air Surveillance and Reconnaissance Branch JIATF South team was assessed as operating at Software Engineering Institute Capability Maturity Model Integration (CMMI[†]) Level 2. The team was also assessed as operating at CMMI Level 3 in two process areas: (1) project planning, and (2) measurement and analysis. The assessment was based on an externally led Standard CMMI Appraisal Method for Process Improvement (SCAMPI[‡]) Class A appraisal completed in January.

JIATF South is one of two CMMI-rated teams at SPAWAR (see "Tactical Communication Solutions [TCS]" in the Command and Control section of this document). Only three other teams in the Department of Defense services, one in the U.S. Navy and two in the U.S. Army, are listed as CMMI-rated. The achievement of a CMMI Level 2 rating validates that an organization is using well-managed processes in conformance with seven CMMI process areas.

JIATF South conducts multi-sensor track and information processing and command and control operations in the United States Southern Command area of responsibility. The Center is responsible for JIATF South software development, systems engineering, systems integration, configuration management, quality assurance, testing, training, on-site installations, and operational and maintenance support.

[†] CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.

[‡] SCAMPI is a service mark of Carnegie Mellon University.

MARINE AIR TRAFFIC CONTROL AND LANDING SYSTEM (MATCALS)[24]

The Air Command and Control Branch, which provides comprehensive engineering, technical, and logistics support for MATCALS subsystems, was selected by the Air Traffic Control Association for the Association's Life-Cycle Management Award. The award recognizes individuals, groups, and organizations that have clearly demonstrated outstanding performance, service, dedication, and contributions to the field of air traffic control.

MATCALS is a shelterized, transportable, automated air traffic control system that supports all-weather aircraft operations at expeditionary airfields and remote sites. Combatant commanders are relying heavily on MATCALS equipment to support current combat operations. Typically used for short to medium deployments, MATCALS is now being used for extended periods of time. Nearly 50 percent of available MATCALS equipment and Marine Air Control Squadron personnel have been, and remain, deployed since operations began in Operation Enduring Freedom. The Air Command and Control Branch is supporting deployed Marine Corps air traffic control units, enabling these units to expertly manage 8,260 square miles of airspace.

MK-5 MOD 1 MARINE MAMMAL SYSTEM (MMS)[25]

The MK-5 Mod 1 MMS, formerly known as "Quick Find," was transferred to SSC San Diego's Biosciences Division from Explosive Ordnance Disposal Mobile Unit Three on 1 October 2005.

The MK-5 MMS was established in 1971, with the primary mission of recovering antisubmarine rockets fired for quality assurance testing. In 1984, Commander, Mine Warfare Command directed the use of the MK-5 MMS for the recovery of mine exercise trainers and, more importantly, the scoring of air wings for offensive mining qualifications. During MK-5's 34-year history, the system has recovered over 1,500 items with a hardware value of over $38 million. The systems success rate has remained at 96 percent.

The MK-5 MMS deployment complement has four California sea lions and up to 10 animal trainer/divers, depending on the operation. Four animal trainers maintain the sea lion's deep diving capability in San Diego. The MK-5 MMS can recover up to 40 mines per day, depending on the accuracy of placement data and the recovery craft. They typically recover 15 to 20 mines per day.

The MK-5 MMS operational requirement was revalidated by the Navy and will continue under the direct control of SSC San San Diego Biosciences Division.

OCEAN SURVEY PROGRAM SURVEY SYSTEM[26]

The United Kingdom ocean survey vessel HMS *Scott* provided a highly detailed and accurate survey of the epicenter and surrounding seabed area of the 26 December 2004 earthquake off the coast of Sumatra. Survey results provided data indicating why and where the earthquake occurred, data valuable for understanding and predicting earthquakes, and data that could prove vital in planning a tsunami early warning system.

The United Kingdom Hydrographic Office tasked *Scott* to perform the survey. *Scott* is equipped with the Ocean Survey Program Survey System, a unique and extremely accurate deep-ocean bathymetric survey system designed and developed by the Center's Marine Navigation Division for the United Kingdom Ministry of Defence. The Division also maintains and updates the system.

Scott completed the survey in February 2005. Images released from the surveyed area revealed startling and previously unknown information. Scientists and geologists believe the quake caused the sudden movement of the Indian Plate into the Burma Plate. The sudden movment caused the Burma Plate to spring up, sending water surging up and out and creating the devastating waves that hit the region.

The images resulting from this survey should provide a good bathymetric and geological assessment of the earthquake epicenter and the extended fracture zone, a better understanding of earthquakes that originate beneath the sea floor, data that will assist the prediction of such events, and data that could prove vital in planning the tsunami early warning system to be built in the region.

ROBOTICS TOOLKIT[27]

Center personnel assisted with the design of a tool mount kit (Toolkit) that allows for the excavation of improvised explosive devices (IEDs). Existing robotic manipulator arms are not designed to excavate buried IEDs and frequently fail when subjected to the loading required to excavate the IEDs.

The Toolkit uses the more adequate flipper motors of the iRobot PackBot. The design incorporates a simple mechanical interface to the PackBot and allows for the simple field interchange of various explosive ordnance disposal tools used to disarm IEDs, as well as options for future fabrication of additional tools as needs arise and tactics change.

The design was prototyped at SSC San Diego and initial feedback was gathered from local explosive ordnance disposal groups. The conceptual prototype was made available to iRobot, who had concurrently developed a lifting mechanism that also attaches to the flippers and can lift a 155 millimeter shell (85 pounds). iRobot proceeded with the manufacture of both additions to ensure that the SSC San Diego development would not interfere with the iRobot additions. Both the SSC San Diego Toolkit and the iRobot lifting mechanism have been manufactured as initial prototypes ready for field testing.

JOINT ROBOTICS PROGRAM (JRP) TECHNOLOGY TRANSFER PROJECT[28]

In 2005, the Joint Robotics Program (JRP) Technology Transfer Project achieved successes in two areas: autonomous navigation and explosive ordnance disposal. The JRP Technology Transfer Project, managed by SSC San Diego, seeks to enhance the functionality and autonomy of man-portable robots.

Autonomous Navigation

The JRP team developed an integrated navigation system that provides seamless transition between both indoor and outdoor environments. Previously, all autonomous robots were equipped for operation in either indoor or outdoor scenarios, but not both. The team first examined existing autonomous navigation technologies and assessed the different approaches to dead reckoning, obstacle detection/avoidance, mapping, localization, and path planning. The best features of the more promising solutions were then integrated into an optimal system with significantly improved performance capabilities. Previous systems needed a detailed, "a priori" map to autonomously navigate; now a system can be sent into an unknown area, with no advance information, and accurately map the environment while simultaneously avoiding obstacles.

Explosive Ordnance Disposal

In October, the first experiment was conducted in which an unmanned ground vehicle (UGV) was cued to search an area given by an unmanned aerial vehicle (UAV). The UGV successfully detected, mapped, and marked on the ground the location of all buried land mines. The JRP team is working with Foster Miller, Incorporated and iRobot Corporation to enhance the effectiveness of their man-portable commercial-off-the-shelf systems used in theatre for explosive ordnance disposal missions. The goal is to demonstrate a team of small UGVs and UAVs to collaboratively conduct semi-autonomous countermine operations.

BIOASSAY TECHNOLOGY[29]

The Office of Research and Technology Applications (SSC San Diego Technology Transfer Office) announced the signing of an exclusive license with Assure Bioassay Controls, Incorporated. The company specializes in the measurement and reporting of toxicity for civilian and military requirements. New products from the company will use bioassay technology developed and patented by the Environmental Sciences and Applied Systems Branch.

The commercialized instrument, QwikLite 200Å, is the first economical, easy-to-use system to quickly detect harmful substances in the environment. QwikLite 200Å uses selected species of plankton to measure changes in bioluminescence and fluorescence of plankton exposed to suspected toxic water or soil samples. The plankton are much more sensitive than the shrimp or juvenile minnows traditionally used for toxicity testing. Shrimp and minnows are higher life forms with natural defenses that often do not show toxicity levels for several days, if at all. The plankton can reduce time to 24 hours in most cases for a fraction of the cost. In addition, unlike other test organisms, the plankton make their own food, need no special handling except periodic exposure to light, and are easy to use.

The Center for Commercialization of Advanced Technology[§] played a key role in facilitating the commercialization of bioassay technology.

JOINT ARCHITECTURE FOR UNMANNED SYSTEMS (JAUS)[30]

The Adaptive Systems Branch continued to support JAUS development through robotics experiments. In 2005, the Adaptive Systems Branch represented the Center at the Society of Automotive Engineers (SAE) AS-4 Unmanned Systems Technical Committee meeting. JAUS is migrating to SAE. The Aerospace Council of SAE voted to establish JAUS as an aerospace standard within a year. The embracing of JAUS by SAE reveals the positive progress of its widening acceptance as the standard for unmanned systems in the commercial sector.

JAUS is an upper level software design for the interface of unmanned vehicles. JAUS has allowed robots developed by private industry and all military branches to communicate for interoperability. The Branch has implemented the JAUS architectural design and its message protocol to Center robots from the Man Portable Robotic System project. JAUS is intended to reduce life-cycle costs, development, and integration time. Its architecture provides a sufficient framework for accommodating technology advances and inserting new capability on existing systems.

JAUS is sponsored by the Office of the Under Secretary of Defense and is directed by the Joint Robotics Program that mandates its use by all of its sponsored programs.

MULTI-INFLUENCE TRIPWIRE SYSTEM (MITS)[31]

In October 2005, two Multi-Influence Tripwire System (MITS) sensor nodes were successfully deployed in the waters off of Port Hueneme, California. The MITS work is investigating new subsurface sensors for the Mobile Inshore Undersea Warfare (MIUW) community. The project adapted certain technologies

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[§] The Center for Commercialization of Advanced Technology is a public-private collaborative partnership between academia, industry, and government. Partners include San Diego State University (SDSU) Research Foundation and Entrepreneurial Management Center, the University of California, San Diego (UCSD) Jacobs School of Engineering, the von Liebig Center for Entrepreneurism, The Security Network, and the Space and Naval Warfare Systems Center San Diego.

from the Deployable Autonomous Distributed System (DADS) to create an autonomous sensor for the MIUW harbor approach defense mission.

The MITS acoustic sensor consists of a seven-element planar array in which each element is a miniaturized Directional Frequency and Ranging (DIFAR) sensor. The magnetic sensor is a commercial off-the-shelf, full-field Overhauser magnetometer from Marine Magnetics. The subsurface nodes automatically form multiple beams spanning 360 degrees that continually track all contacts in range of the sensor. The nodes are connected to a surface float for RF connectivity to shore.

During the test, both units collected acoustic and magnetic data and generated acoustic contact reports. A base station received the contact reports, logged them, and sent them to the Graphical Data Fusion System (GDFS). GDFS successfully received the reports and displayed the data along with other MIUW sensor information. Information is only sent to shore when a contact has crossed a user-defined bearing of interest, allowing the sensor to meet its objective of operating as a trip-wire.

The test was performed near the entrance to Port Hueneme to take advantage of a number of factors. The vessel traffic density is less than other Southern California ports and the entrance to the harbor is quite narrow. This allowed the project team to effectively perform surveillance using just two prototype sensors. This sea test and the associated report are the culmination of the first phase of the MITS development effort.

The MITS work was funded through Program Executive Officer, Command, Control, Communications, and Computers and Space Systems (PEO-790). The project adapted certain technologies from the Deployable Autonomous Distributed System (DADS) to create an autonomous sensor for the MIUW harbor approach defense mission. The DADS system was funded through the Office of Naval Research, Littoral Antisubmarine Warfare, Future Naval Capability, with the majority of the work performed by the Autonomous Undersea Systems Branch. DADS combines magnetic and acoustic sensors with the goal of reducing the system false alarm rate in a cluttered environment.

COMMAND AND CONTROL

AEGIS BALLISTIC MISSILE DEFENSE (BMD)[32, 33]

Note: Accomplishments described here occurred in CY 2004.

SSC San Diego provided test support to Aegis BMD Test Six. During Test Six, the Aegis cruiser USS *Lake Erie* (CG 70) successfully intercepted and destroyed a short-range target missile launched from the Hawaiian island of Kauai. It was the fifth successful intercept in six tests and marked the first use of an operationally configured Standard Missile III interceptor.

The Aegis BMD is an integral part of the system now being developed, tested, and fielded by the Missile Defense Agency. It is part of a layered system designed to intercept and destroy short, medium, intermediate, and long-range ballistic missiles during any phase of their flight.

Test coordination was executed from SSC San Diego's Ballistic Missile Defense System Test Bed (BTS). The Navy test officer coordinated the command and control and maintained real-time situational awareness of the test with the systems and connectivity of the BTS and Systems Integration Facility. The BTS supported the event with ultrahigh frequency (UHF) satellite communication and Secret Tactical Digital Information Link-Joint (TADIL-J) systems connectivity.

COMMON DATA LINK MANAGEMENT SYSTEM (CDLMS)[34]

The SSC San Diego CDLMS program continued to provide technical and operational support to the Missile Defense Agency. CDLMS provides for the exchange and dissemination of tactical information between sites and platforms. In the ballistic missile defense exercise Stellar Dragon, conducted 24 February 2005, CDLMS software successfully took missile information from the combat system, including intercept/tracking data, and sent it to communication link participants monitoring and taking action on the launch. The CDLMS connects the combat system to the ship in multiple communication paths. The CDLMS software was developed and is maintained by the Tactical Data Link Systems Engineering and Development team.

CHEM-BIO INFORMATION SYSTEMS[35]

The Chem-Bio Information Systems Software Support Activity (SSA) continued to support the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD). In June 2005, the SSA was officially chartered by the JPEO-CBD. The SSA has provided support to the JPEO-CBD and its JPM programs since August 2004. At SSC San Diego, the SSA team is directed and managed by the C2 Technology and Experimentation Program Development Branch and the Effects Based Information Systems Branch.

The SSA is employed by the JPEO-CBD under the direction and management of the JPM for Information Systems (JPM IS). The JPEO-CBD is a joint program formed by the Department of Defense in 2003 to focus on the protection of warfighters against the use of battlefield chemical and biological weapons.

COLLABORATIVE INFORMATION ENVIRONMENT (CIE)[36]

In 2005, The E-Gov Institute recognized U.S. Joint Forces Command's innovative work in knowledge management for its efforts with the CIE. The Center's Command and Control Engineering, Tidewater team members were part of the team responsible for successfully fielding the CIE.

The knowledge management award recognized CIE for its successful integration of commercial technology, capability to solve significant business problems, and the benefits to the warfighter, including:

- Empowering the joint force staffs' ability to plan, execute, and assess military operations in a functional manner across geographically distributed echelons, coalition partners, and outside agencies.
- Giving joint force staffs access to volumes of relevant data and information through an enterprise portal to support action planning, execution, and assessment, allowing warfighters to quickly make better decisions.
- Enabling effective knowledge management by giving an operational commander the advantage over an adversary.

U.S. Joint Forces Command is working to integrate CIE concepts into joint doctrine.

HURRICANE KATRINA AND PAKISTAN EARTHQUAKE ASSISTANCE[37]

NMES Support[38]

The Navy Marine Corps Enterprise Services (NMES) team provided support to Hurricane Katrina assistance efforts, including establishing a collaborative environment for a Navy Crisis Action Team and public information resources for Navy families.

On 1 September, the NMES team was tasked by Assistant Chief of Naval Operations (CNO)–Information Technology and Office of the Chief of Naval Operations (OPNAV) N71 to establish a collaborative environment for the OPNAV Katrina Crisis Action Team. The NMES team immediately began supporting the Crisis Action Team with Navy Marine Corps Portal's Web-based collaborative intranet environment for watchstanders. The CNO's daily briefings were posted for full distribution along with community pages that provided information on conditions in the hurricane areas and the Navy's efforts. The NMES team provided onsite support, as well as extended SSC San Diego site lab and help desk support, until 1 October.

On 9 September, the NMES team was tasked with establishing a public information resource for Navy families affected by Hurricane Katrina. With the support of SSC San Diego's Network Security Team and the SSC San Diego Public Affairs Office, a website was made live on 10 September, designed specifically for dynamic updating and streamlined navigation to critical information sources.

On 14 September, Task Force Navy Family was established to conduct full-spectrum community service operations in order to provide a rapid and coordinated return to a stable environment for Katrina-affected Navy families. The U.S. Navy Katrina Help site was rapidly rebranded and retooled to support the Task Force Navy Family's dissemination of public information to Navy families.

Composeable FORCEnet Support[39]

To support Hurricane Katrina relief efforts, SSC San Diego's Composeable FORCEnet[40] system was installed in the Navy's Operations Center. The system was installed and tested on the unclassified network. Due to security policies, classified Navy information normally available to Composeable FORCEnet was not passed down to the unclassified network. As a result, Composeable FORCEnet was

uninstalled on the unclassified network and then reinstalled on the Secret Internet Protocol Router Network (SIPRNET). Navy track information was then available through Composeable FORCEnet.[**]

C4SS Support[41]

The Command, Control, Communications, and Computer Systems Support (C4SS) team assisted in two major disaster relief efforts: Hurricane Katrina recovery and earthquake assistance to Pakistan. The C4SS team includes members from SSC San Diego Command and Control Engineering, Tidewater; private industry; Naval Sea Systems Command; and SSC Charleston. The team supported United States Joint Forces Command, Standing Joint Force Headquarters (SJFHQ) in their disaster relief efforts.

The Center's C4SS support team members worked to ensure the SJFHQ planners had the communications and information technology support to enable the planning and collaborative coordination required to meet their mission.

The C4SS team worked closely with the knowledge management cell of SJFHQ team to provide requirements definition and tool development. The C4SS and knowledge management teams developed and provided two tools:

- The Interagency Collaborative Hurricane Assessment Tool to track the progress of hurricane recovery by an individual county or parish, based on the Federal Response Plan Emergency Support Functions.

- Earthquake Relief Supply Assessment Tool to track the movement of supplies to the affected regions in Pakistan.

Gulf Coast

C4SS team members deployed with the SJFHQ to Baton Rouge and directly assisted the Federal Emergency Management Agency. They supported Federal Coordinating Officer Michael Brown and his replacement, United States Coast Guard Chief of Staff Vice Adm. Thad Allen, in overseeing New Orleans relief and rescue efforts.

Pakistan

Commander, Expeditionary Strike Group One was designated as Disaster Assistance Coordinator in Pakistan. The C4SS team members arrived on site in Chaklala, Pakistan, and immediately began aiding the planning of coalition disaster assistance efforts with SJFHQ. The C4SS team also assisted the SJFHQ by working with the Joint Mobile Ashore Support Terminal team to provide Non-Secure Internet Protocol Router Network (NIPRNET), SIPRNET, and print capabilities.

For coordination, the team maintained the Defense Switched Network, iridium satellite phones, local cell phones, and two military walkie-talkie systems. For fallback communications, they established NIPRNET and SIPRNET connectivity on the Executive Command and Control System, and NIPRNET on a stand-alone Regional Broadband Global Area Network system.

[**] The next day, the Chief of Naval Operations declared all information regarding Katrina was to be exclusively maintained and distributed on the unclassified network. Composeable FORCEnet on the SIPRNET was not required and was removed from the Operations Center.

NAVAL FIRES CONTROL SYSTEM (NFCS) ADJUNCT PROCESSOR[42]

The NFCS and its Adjunct Processor successfully completed software and hardware integration testing on USS *Lassen* (DDG 82). Algorithms and software were developed that integrate, in near real-time, the common operational picture, meteorological data, air tasking orders, and various other command and control data for naval fires. Adjunct Processor life-cycle support processes were implemented and briefed to fleet representatives in Norfolk and San Diego.

NFCS is a tactical system on a Windows platform and Adjunct Processor is the server for naval fires. The Adjunct Processor product goes onboard DDGs (guided missile destroyers) to support various command and control issues such as common operational picture, processing air tasking orders from the Air Force Theatre Battle Management Core System, and interfacing with Global Command and Control System-Maritime (GCCS-M). Along with GCCS-M 4.X, the NFCS Adjunct Processor is one of the first systems to be fielded based on the common operating environment 4.X baseline.

The NFCS Adjunct Processor is sponsored by Program Executive Office, Integrated Warfare Systems. The Center's Advanced Command and Control Technology and Experimentation Division is responsible for all of the development, testing, and C^4I (command, control, communications, computers, and intelligence) engineering for the NFCS Adjunct Processor.

TACTICAL COMMUNICATION SOLUTIONS (TCS)[43]

In 2005, the TCS team was assessed as operating at a Capability Maturity Model Integration (CMMI[††]) Systems Engineering/Software Engineering Maturity Level 2. This determination was based on a Standard CMMI Appraisal Method for Process Improvement (SCAMPI[‡‡]) Class A appraisal.

The achievement of a CMMI Level 2 rating validates that an organizational unit is using quality processes in conformance with seven process engineering and management areas to provide high-quality products and services to its customers. TCS joins an elite group of Department of Defense organizational units to have achieved Level 2.

The TCS team develops, installs, services, and maintains Data Link Test Tool systems and provides software and systems development for specialized tactical data link projects. The improved processes TCS developed and put into place over the past 4 years, as evaluated in the SCAMPI, have resulted in increased efficiencies, product quality, and enhanced customer service.

TCS is the first unit in the Command and Control Department, and only the second at SSC San Diego, to achieve a CMMI Level 2 designation in a registered appraisal (see "Joint Interagency Task Force South [JIATF South]" in the Navigation and Applied Sciences section of this document).

[††] CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University

[‡‡] SCAMPI is a service mark of Carnegie Mellon University.

FLEET ENGINEERING

USS *CITY OF CORPUS CHRISTI* MODERNIZATION[44]

The USS *City of Corpus Christi* (SSN 705) modernization project in Guam successfully completed the *City of Corpus Christi* modernization. Completed in only 4 months, the "705" was a team effort that included participation by SSC San Diego Facility, Guam; Naval Sea Systems Command; Space and Naval Warfare Systems Command; Naval Undersea Warfare Centers (Keyport and Newport); Norfolk Naval Shipyard; and Pearl Harbor Regional Maintenance Center.

DECOMMISSIONED SHIP EQUIPMENT REMOVAL[45]

The Fleet Engineering Decommissioned Ship Equipment Removal Team maximized their efforts and reduced the costs of moving equipment from the USS *O'Brien* (DD 975), USS *Fletcher* (DD 967), USS *Valley Forge* (CG 50), USS *Ticonderoga* (CG 47), USS *Fife* (DD 991), USS *Oldendorf* (DD 972), USS *Elliott* (DD 967), and USS *Independence* (CV 62). The team effectively managed removal of a variety of exterior and interior communications equipment. The equipment is targeted for future fleet needs, ensuring a timely, cost-effective reutilization of assets.

Cost savings for these eight ships were realized by consolidating the effort from eight people to a focused, in-house team of four people. Labor savings for this consolidation were $23,040 per ship or $184,320 for the eight ships. Travel costs and per diem were reduced by $6,000 and crane service savings established were $12,000 per ship or $96,000 for the eight ships.

The team also conducted the equipment removals on a short 6-week schedule, thus ensuring that all scheduling, type commander, ship, and naval inactive force requirements were met. The removed equipment from each of these ships will be repaired, refurbished, or overhauled for future use on other Navy platforms or shore sites.

WISE TECHNOLOGY[46]

The Systems Support Engineering Division has successfully addressed major obsolescence and supportability issues with its array of radio frequency automated test systems (ATSs), along with associated automated test equipment. Using WISE Technology, developed by the Division's ATSs Integrated Product Team, signficant cost avoidance was achieved and downtime reduced. WISE Technology allows simple replacement of obsolete instruments residing in an ATS without changes to the software and regardless of the programming language. Phase II, conducted in 2004–2005, achieved a cost avoidance of more than $12 million (Phase I achieved a cost avoidance of $2 million). The downtime of the upgraded ATS platforms that use the WISE Technology went from 50 percent to less than 2 percent.

INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

EXTENSIBLE TACTICAL COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE FRAMEWORK (XTCF)[47]

The Joint and National Systems Division XTCF team participated in the Defense Information Systems Agency (DISA) Net-Centric Capabilities Pilot Oktoberfest demonstration. The team delivered cutting edge, Service Oriented Architecture-inspired software in support of a month-long series of events. These were held at the U.S. Strategic Command, Omaha, Nebraska, 2–4 November; the U.S. Joint Forces Command, Norfolk, Virginia, 16–18 November; and at DISA facilities in Washington, DC. XTCF software delivered live, national command and control data in a published and subscribed model for numerous strategic consumers.

XTCF provides architecture to field new data management, correlation, and visualization tools rapidly in a dynamic warfare environment, empowering intermediate and end users to compose their tactical picture from a variety of loosely coupled services distributed across the network. Experience gained from participating in the Net-Centric Capabilities Pilot Oktoberfest helps to ensure that evolving command and control capabilities that support the Fleet are in line with net-centric services for all of Department of Defense.

ADVANCED DEPLOYABLE SYSTEM (ADS)

Note: Accomplishments described here occurred in CY 2004.

SSC San Diego supported ADS development in two significant efforts: Buoy Proof of Concept (BPoC) testing and Task Force Antisubmarine Warfare Exercise 2004 (TASWEX-04) participation.

The ADS is a passive acoustic undersea surveillance system designed to detect, classify, localize, track, and report surface ships and submarines in the littoral battle space in real time. The first operational use of ADS will be as an antisubmarine warfare module aboard an LCS (littoral combat ship).

BPoC Testing[48]

SSC San Diego conducted BPoC testing to demonstrate high-data-rate radio frequency communications from a buoy to an afloat unit at significantly useful distances. The testing compared two different radio technologies for ocean buoy applications as well as investigating wave energy conversion technology to power the buoy electronics. The buoy is part of the ADS Tactical Interface Subsystem. It will transmit data from the ADS arrays to an analysis and reporting subsystem aboard the LCS. The SSC San Diego system consists of an instrumented buoy, a mooring subsystem designed for a 200-meter water depth, a digital radio, and launch and recovery equipment.

Full-scale testing of the SSC San Diego buoy and an experimental wave energy conversion buoy were conducted in September and October 2004. The goal was to collect data at multiple ranges under sea state conditions that varied from zero to four. The team commenced the test with an objective of achieving data transmission rates on the order of 1 megabit per second at a range of 30 nautical miles from the buoy; the objective was easily met. The team also demonstrated several other significant improvements, including remote command and control of the buoy, an asymmetric data link, improved protocols, improved electronics, a folded conical helix antenna design, and data logging and retrieval via radio link.

Test results showed that the buoy was able to transmit data at bandwidths and ranges that exceeded ADS operational requirements. The project was an important technical hurdle for ADS and potentially has applicability to other sensor applications.

TASWEX-04[49]

SSC San Diego conducted the ADS participation in TASWEX-04, a major fleet exercise conducted from 30 October to 8 November 2004 by Commander Seventh Fleet in the littoral region of the Western Pacific between Japan and Taiwan. TASWEX-04 objectives were to conduct battlespace preparation, restrict adversarial conventional submarines, establish a maritime shield, and conduct rapid antisubmarine warfare. Another objective was to conduct rapid access operations against an adversarial conventional submarine through a netted force of deployed off-board surveillance systems, attack submarines (nuclear propulsion), the Surveillance Towed Array Sensor System, landing crafts, guided missile destroyers/conventional destroyers, and maritime patrol aircraft.

ADS was the primary offboard system in TASWEX-04 tasked to:

- Detect and localize diesel–electric submarines in a tactical environment
- Demonstrate ADS cueing to tactical assets for target prosecution
- Provide timely input to the maritime tactical picture
- Evaluate acoustic and localization performance
- Evaluate ADS time-late performance
- Assess automated array element localization
- Collect reliability, maintainability, and surveillance ability data

Participation in the exercise produced a unique, robust data set that will provide insight into the intricacies of detecting and tracking diesel–electric submarines.

DEEP SUBMERGENCE RADAR[50]

During sea trials in October 2005, *USS Dolphin* (AGSS 555) completed tests of a newly designed Deep Submergence Radar during dives to depths in excess of 3,000 feet. The radar's performance exceeded expectations and met all design goals. The Deep Submergence Radar corrects a long-standing deficiency on *Dolphin*, the Navy's deepest diving submarine.

Dolphin's previous AN/BPS-15 radar system was seldom fully operational, was difficult to maintain, and was not optimized to detect contacts close to the submarine. When surfacing the ship, a critical time for any submarine, the old radar was slow in coming on line, and the ship's control party was not able to get an immediate navigational picture. This delay became even more critical in conditions of low visibility.

A review of standard Navy radars quickly established that none could be modified to meet the unique depth requirements of *Dolphin*. The primary requirement for the new radar was the ability to scan the surface for contacts immediately on surfacing and provide rapid feedback on the course and speed of surface contacts. The need to function reliably after repeated excursions to depths well beyond the capabilities of standard fleet submarines was an overarching requirement.

Ocean Systems Division engineers proposed a design for a replacement navigational radar that capitalized on the Center's advanced research in ceramic materials and took full advantage of commercial off-the-shelf components. The radar design uses a commercial off-the-shelf Furuno model with the outboard transmitter encased in a titanium and ceramic cylinder. The cylinder is designed for both pressure resistance and minimum radar signal loss, and contains internal radar absorptive material to minimize reflected signals. The ceramic pressure housing was developed by the Center based on the Center's work with other deep-ocean systems.

Designed as a temporary alteration, the Deep Submergence Radar design's success will allow the technical design package and logistics support to be converted to a permanent ship's alteration without modification. The Ocean Systems Division team conceptualized, designed, procured, assembled, tested, and delivered the new radar in 9 months.

NOTS PIER, SAN CLEMENTE ISLAND[51]

On 22 September 2005, a ribbon-cutting ceremony was held at San Clemente Island for the new SSC San Diego Pier. The new pier will enhance SSC San Diego's underwater research, development, test, and evaluation of weapons systems; unmanned vehicles (air, surface, and underwater); and a variety of future naval capabilities. In keeping with this expanded role, the new pier will be known as Naval Ocean Test Support (NOTS) Pier. The original pier was constructed in the early 1950s and was called the Naval Ordnance Test Station (NOTS) Pier, named for the Center's predecessor organization, located in Pasadena and China Lake, California. (See the referenced *Outlook* article for a short history of the Center's technical accomplishments at San Clemente Island).

COMMUNICATIONS AND INFORMATION SYSTEMS

EXTREMELY HIGH FREQUENCY (EHF) LAND BASED TEST FACILITY (LBTF)[52]

On 2 August 2005, the Protected Satellite Communications Branch hosted a ribbon-cutting ceremony for the new Building 640 in the EHF LBTF. The new building will expand support for advanced EHF, transformational communications, Time Division/ Demand Multiple Access Interface Processor, and joint interoperability testing in a FORCEnet[53] environment.

The EHF LBTF began its operations in 1972 to study the impact of vessel motion and wave slap on periscope antenna tracking accuracy. Since then, several generations of Navy EHF satellite communications program ship and shore terminals have been rigorously tested. In partnership with Program Executive Office, Command, Control, Communications, Computers, Intelligence, and Space, the LBTF continues to provide acquisition and fleet support in the form of software beta testing, terminal adaptation data, antenna failure analyses, system engineering and test and evaluation afloat and ashore.

The facility also provides remote terminal support for Massachusetts Institute of Technology Lincoln Laboratory UHF Follow-On constellation tracking, telemetry, and control functions. The new building will provide necessary administrative space to support expansion of the laboratory facility. In addition, provision has been made to mount an advanced EHF AEHF Navy Multiband Terminal 10-foot shore antenna on the roof tower of the new building.

Over the next few years, the expansion will bring the LBTF test and evaluation capabilities fully into the net-centric FORCEnet environment, including connectivity with the Center's emerging Global Information Grid Evaluation Facility.

INTEGRATED CIRCUIT FABRICATION FACILITY (ICFF)[54]

Note: The events described here occurred in CY 2004.

The ICFF closed its doors in 2004 after 36 years of service. The ICFF provided expertise and support for Department of Defense integrated circuit and sensor manufacturing technology. In August 2004, it was decided that the service center that operated the ICFF would cease operations on 30 September and that all silicon processing would be completed by 31 October 2004. By the end of November 2004, it had been decided that most of the $25 million worth of processing equipment housed within the ICFF would be transferred to the Defense Micro-Electronics Activity located in Sacramento, California. A large portion of the tool set was subsequently transferred from the Defense Micro-Electronics Activity to Peregrine Semiconductor (Australia) for further development of integrated circuits in silicon-on-insulator and silicon-on-sapphire technologies.

See referenced *Outlook* article for a short history of ICFF accomplishments.

MICRO-ELECTRO-MECHANICAL SYSTEMS (MEMS) ACCELEROMETER[55]

SSC San Diego's MEMS accelerometer was selected as one of the world's top technologies by the World's Best Technology Showcase held 28–30 March 2005. The World's Best Technology Showcase is a national competition showcasing seed and pre-seed stage technologies developed at the nation's top universities, federal labs, federally supported research and development institutions, and private industry. Participating technologies represent a convergence of industry sectors, including life sciences, advanced materials, energy, software, semiconductor, and agriculture.

The MEMS accelerometer, developed collaboratively between the Advanced Circuits and Sensors Branch and the Navigation and Applied Science Department, is a revolutionary approach to measuring the displacement MEMS. The research is based on the monolithic integration of an optical resonant cavity with a silicon photodiode using a Universal MEMS Integrated Dual-Spring fabrication process developed at the ICFF (see related article above). Potential applications of MEMS sensors include:

- Autonomous disposable sensor arrays
- Weight, power, and fuel reduction for avionics navigation platforms
- Inertial guidance for unmanned aerial vehicles and unmanned underwater vehicles
- Guidance and fusing of "smart" munitions
- Chemical and biological detection
- Optical communications
- Condition-based monitoring of equipment

The World's Best Technology Showcase is produced in cooperation with the Federal Laboratory Consortium for Technology Transfer and the National Association of Seed and Venture Funds. SSC San Diego's technology was the only Department of Defense project selected.

APPENDIX A: CY 2005 ACHIEVEMENT AWARDS

DEPARTMENT OF DEFENSE AWARD

Information Management, First Place Award

Brian Jones received the 2005 Department of Defense (DoD) Chief Information Officer, First Place Award, Individual Category. Jones serves in Code 2425, Command and Control Engineering Tidewater, Virginia. He was cited for outstanding achievement in DoD information management based on the spirit and intent of the Clinger-Cohen Act of 1996, which supports improved information management and information technology. The award was presented to Jones at the Pentagon on 29 September.

NAVY AWARDS

Navy Meritorious Civilian Service Awards

Robert Abramo established a full-scale test facility to evaluate broadband high-frequency antennas built by different manufacturers. He used measurement results to determine their feasibility for use on Navy ships. His contributions have improved high-frequency communications, a key to interoperability with allied naval forces.

Dr. Gerry Baumgartner applied geo-location to radio frequency communications and ultrahigh frequency satellite communications. He led development of hardware and software to geo-locate emitters by combining national and tactical sensor systems. He also classified satellite communications system vulnerability and developed a set of algorithms and software tools that enable the Fleet to predict environmental effects on battle group radar coverage.

Mark Blocksom led Collaborative Operations and Responsive Technology Experimentation (CORTEX) that now serves as a reconfigurable environment to conduct real-world operations and aid in the development of new capabilities. CORTEX was used by Commander Third Fleet in the recent joint task force exercise and Blue Flag exercise.

Tom Cassidy. Because of his leadership as the deputy department head for operations in the Intelligence, Surveillance, and Reconnaissance Department, the overall discipline, performance, and working climate of the department continued to rise. One of the leaders in the Corporate Information Group, he tackled difficult Center-level problems and was a tireless advocate of employee quality-of-life issues.

Donald Christy used his experience and knowledge to evaluate and test communications security equipment worldwide. The National Security Agency consulted frequently with him on new and challenging problems. Christy's current work is directly impacting the design and implementation of several Joint Tactical Radio System variants and their host platforms.

Sandi Courtney manages the Commanding Officer's dynamic schedule at SSC San Diego. She expertly prepares the Commanding Officer with all necessary briefs and background information for his travel and for all visitors coming to SSC San Diego. She is constantly praised for her professionalism and cordiality when dealing with the front office staffs of SSC San Diego's sponsors and customers.

John Gerber is project manager and lead engineer for the Electro-Optic Surveillance Program. He has directed the program from a $400 thousand effort to a $3 million-plus per year effort with prospects for continued growth across a wide range of sponsorships.

Ralph Glenn led a 40-member team that provided unique cryptologic and intelligence systems software applications to more than 20 Navy shore installations, 200 afloat units, the Army, the Marine Corps, and the National Security Agency. His innovative leadership was responsible for the Cryptologic Unified Build Project achieving Software Capability Maturity Model Level 3.

Lynetta Grajeda is the lead software developer on the Navigation Sensor System Interface for the Display Control Subsystem (DCS). DCS provides a real-time display where own-ship navigation data and radar contacts are overlaid on digital nautical charts. Grajeda provides technical guidance and direction to the DCS development team programmers for new software design and development.

David Guitas led the SSC San Diego Consolidated Production Facility through a major expansion of its production capacity. He investigated a defective modification kit design provided by a contractor for shipboard installation. While typical development cycles for such efforts normally require 120 to 180 days, he was able to design, manufacture, and deliver the new modification kits in just 24 days, meeting critical shipboard installation schedules.

Laura Hampton leads the resource management team that enables the Tactical Systems Integration and Interoperability Division to consistently meet or exceed all fiscal year in-process and year-end financial metrics. Her leadership directly contributed to the success of the division's Ballistic Missile Defense initiatives.

David Hayashi played a key role in the development and deployment of the Automated Digital Network System and Sensitive Compartmented Intelligence (SCI) Networks, now cornerstones of the FORCEnet architecture. As the acting assistant program manager for the SCI Networks, he reinvigorated the program and prevented delays in fielding this critical FORCEnet component.

John Howard is the Center liaison to the FORCEnet chief engineer and leads the effort to prepare the FORCEnet Technical Reference Guide. This guide will cover all aspects of FORCEnet for acquisition program managers. As technical lead for the FORCEnet Implementation Baseline, he helps ensure that SSC San Diego holds a leadership position in establishing the FORCEnet model.

Chun Hui led two Defense Intelligence Agency (DIA) Communications Working Groups in deploying new information technology (IT) communications capabilities supporting DIA's Joint Worldwide Intelligence Communications System. He also developed strategies to transition legacy IT architectures and organizations to the regional service centers. This transition supports DIA's initiative to obtain significant cost savings and vastly improve responsiveness of IT services.

Gary King prepared and presented many briefs throughout the cryptographic and Global Positioning System (GPS) communities to ensure that the Center remains a highly visible and recognized organization in both communities. He managed development of the only online system that tracks GPS user equipment. Under his direction, the Center has successfully deployed software that meets the high-quality standards of the Software Engineering Institute Capability Maturity Model.

Tom Knoebel is a subject-matter expert in materials, corrosion control, failure analysis, and ionizing radiation. He has demonstrated an ability to quickly adapt to constantly changing management responsibilities. He continually contributes to many committees, boards, and working groups. He successfully pursues many disciplines across diverse projects in demanding situations.

Guy Leonard served as the deputy for business and then as division head for the Advanced Concepts and Engineering Division. Under his leadership, key advances were made in the FORCEnet architecture, over-the-horizon targeting, joint interoperability testing, naval fires, and collaboration.

Brian Matsuyama is an expert in antiterrorism and force protection, particularly in the command, control, and communications aspects of physical security systems. His recent efforts resulted in the delivery of

two operational integrated anti-swimmer systems. Coast Guard Headquarters commended his work on these systems, which address threats to the security of ports, harbors, and waterways.

Nancy Miller initiated adoption of the all-optical TB-29A Twin Line configuration and continuously organized development resources for factory integration. This array significantly improves the already exceptional performance of the Surveillance Towed Array Sensor System and will ensure that the sensor remains in the forefront of fleet antisubmarine warfare operations.

Maureen Myer is project manager for the Joint Cross-Domain Exchange (JCDX). This project has a yearly budget of $11 million with funding distributed across a team of more than 70 personnel. The JCDX system is the only fully certified and fielded, multilevel secure command, control, communications, computers, and intelligence (C^4I) system in the world. It operates 24 hours a day,7 days a week, supporting real-world tactical and strategic operations.

James Parsons led the Radio Frequency (RF) Communications Systems Division technical staff. As the Joint Tactical Radio System (JTRS) Technology Laboratory program manager, he led the JTRS Test and Evaluation Facility for Software Communications Architecture Compliance to successful initial operational capability. His efforts have enhanced fleet communications capability.

Bernie Schneiderman manages the C4I Programs, Hawaii Group, of the Command and Intelligence Systems Division. He is aware of customer requirements and proactively develops new efforts in diverse technical areas, making his group a preferred resource for the commands on the islands.

Greg Settelmayer led his team to develop network-centric concepts that later became recognized as one of the key enabling elements of the FORCEnet architecture. He continues to lead efforts to promote network-centric concepts related to software and systems development.

Hale Simonds delivered new capability to the Navy and diversified the Antennas and RF Technology Branch business base. He developed advanced modeling and simulation capability in antenna design and assembled a high-performance team to design and build antenna systems. He continues to assist SPAWAR PMW-180 with evaluation of antennas and radio-frequency components for signals intelligence and information operations.

Ken Simonsen led his team to assess the impact of localized GPS jamming at the tactical level in the battlespace and at or near teleports and Global Information Grid interfaces. Simonsen and his team provided tactical insight previously not realized, culminating in investment recommendations to maintain tactical superiority.

Dr. Mark Stell is the naval networking lead for developing the Program Executive Office C4I and Space Technology Roadmap, the Automated Digital Network System future architecture, and Navy migration to the Global Information Grid Black Core Architecture. He created a new field of system engineering called "Simulation-Based Acquisition."

Todd Webber manages several multi-million dollar marine mammal and unmanned undersea vehicle projects. He ensures project success and sponsor and customer satisfaction, as evidenced by the successful use of marine mammals and unmanned underwater vehicles by Naval Special Clearance Team ONE during Operation Iraqi Freedom.

Donna Williamson manages the Task Force Web, Information Assurance Tracking System, and Navy/Marine Corps Enterprise Services projects. Williamson is the driving force behind the development and fielding of service-oriented architectures for the Navy.

Peter Wussow manages the Composeable FORCEnet operational prototype for theater antisubmarine warfare. His team of scientists and engineers developed and delivered the first major instantiation of the Composeable FORCEnet capability to the Fleet in 8 months at Submarine Task Force 74.

John H. C. Yen coordinated an 8-month plan to deliver and evaluate all security products required for the National Security Agency. His team will assess the Digital Modular Radio as ready for certification. Yen is currently coordinating the certification and accreditation efforts for a Digital Modular Radio upgrade.

JFCOM Knowledge Management Award

The Collaborative Information Environment (CIE) tool garnered a prestigious award from the U.S. Joint Forces Command (USJFCOM) and the E-Gov Institute. The award was for "best practice in a public sector organization for innovative knowledge management (KM)." Command and Control Engineering, Tidewater (Code 2425), team members Christopher Schiano, Boyd Fletcher, David Jones, John Ash, Brian Jones, and many others were responsible for successfully fielding the CIE. The award recognized CIE for its successful integration of commercial technology, capability to solve significant business problems, and delivery of many benefits to the warfighter.

SPAWAR Lightning Bolt Award

The SPAWAR Research, Development, Test and Evaluation (RDT&E) Working Group received the SPAWAR Lightning Bolt Award. This is a composite team that spans SSC San Diego, SSC Charleston, and SSC Norfolk, and SPAWAR Command Information Officer (Code 08). Working in concert with counterpart teams from Naval Air Systems Command (NAVAIR) and Naval Sea Systems Command (NAVSEA), the team members successfully established the first baseline of all established RDT&E capabilities across SPAWAR and secured full approval of the baseline by the Level 2 Virtual System Command (Virtual SYSCOM). The SSC San Diego RDT&E Working Group members are: Paul M. Lichtenstein, Robert Clark, Celia Metz, Rod Anderson, Michael Dwyer, Dr. Randall Moore, Kate Schemensky, Wanda Parise, Jorge Mora, Ken Kaufman, John Laccone and Mike Phillips.

SMART Scholarship Award

Deborah Goshorn was awarded the U.S. Navy SMART Scholarship. Goshorn is a San Diego State University Contract student working in the Applied Research, Technology, and Sensors Branch (Code 2373). The SMART Scholarship will fund Goshorn's final year in her master's degree program at the University of California San Diego (UCSD) in electrical engineering, with an emphasis in digital signal processing.

EXTERNAL/INDUSTRY RECOGNITION

2005 NDIA Special Achievement Award

Ocean Technology Branch (Code 2744) Head Rich Arrieta received the National Defense Industrial Association 2005 Special Achievement Award for his work with Unmanned Underwater Vehicles (UUVs). Arrieta heads a team that develops C^4ISR for UUVs that have been used by the Navy for operations in Iraq and other locations worldwide. Arrieta led two important projects: Project Elena and the Shallow Water Search System Project (SWSSP). Project Elena involved implementation of command and control through an integrated adaptive mission planner processor and the integration of chemical sensors for chemical source reconnaissance onboard UUVs. The SWSSP project has provided a rapid method for locating waterborne targets of interest that enhance the defense of fighting forces and contribute to national security.

Center Recognized by the American Physical Society

Dr. Adi Bulsara, Applied Research, Technology, and Sensors Branch (Code 2373), has been elected as a Fellow of the American Physical Society. He was cited in his fellowship certificate for "developing the statistical mechanics of noisy nonlinear dynamical oscillators especially in the theory, application, and technology of stochastic resonance detectors." Dr. Bulsara leads the Nonlinear Dynamics Group. He specializes in the physics of nonlinear dynamical systems in the presence of noise. He was one of the earlier proponents of the stochastic resonance phenomenon. Dr. Bulsara said that the Nonlinear Dynamics Group has some truly innovative ideas that could yield performance and cost improvements that are substantially more than simply "incremental," and, in some cases, would significantly alter the dynamics of specific application scenarios over the conventional wisdom.

Center Recognized in Federal Computer Week's "Federal 100"

Sandra Wetzel-Smith was named among this year's Federal Computer Week Magazine Federal 100 in the 21 March issue. Wetzel-Smith was honored for her work with the Interactive Multisensor Analysis Training (IMAT) system. The IMAT system combines three-dimensional graphics, animation, audio, and scientific visualization methods to illustrate complex physical interactions within the context of mission-relevant scenarios. Federal 100 nominations were made by Federal Computer Week readers. An independent panel of judges chose the recipients for their contributions to the development, acquisition, or management of government information technology during 2004.

Government Computer News Agency Award for Innovation

The Center received the 2005 Government Computer News Agency Award for Innovation for its nominated project, the Joint Protection Enterprise Network (JPEN). From a field of 132 nominations, JPEN was one of 11 winners for 2005 to receive this honor. Winners were chosen for their innovation, support of program or policy requirements, and improvement of service delivery. JPEN allows information sharing between authorized users via browser access, appearing to users as a Web application, and making information sharing nearly real time. The award was presented in Washington, DC, on 11 October 2005.

Center-Developed MEMS Accelerometer Selected as One of the World's Best Technologies for 2005

What once was an unfunded graduate research project, and then transitioned into an Independent Laboratory In-house Research (ILIR) project at SSC San Diego, has now been selected as one of the world's top technologies according to the World's Best Technology Showcase held in Arlington, TX, 28–30 March 2005. This technology, developed collaboratively between the Advanced Circuits and Sensors Branch, Code 2876, and the Navigation and Applied Science Department, Code 230, is a revolutionary approach to measuring the displacement of Micro-Electro-Mechanical Systems (MEMS). The research, headed by Dr. Richard Waters (Code 2876), is based on the monolithic integration of an optical resonant cavity with a silicon photodiode using a patent pending Universal MEMS Integrated Dual-Spring (UMIDS) fabrication process developed at the Integrated Circuit Fabrication Facility. Team members included investigators Dr. Thomas E. Jones, Navigation and Applied Sciences Department (Code 2315); Dr. Monti Aklufi (Code 2876, retired); and Hugo Jazo and Mark Fralick (Code 2876). Former New Professionals assisting included Paul Bachta and Raymond Wolfgang.

Air Command and Control Branch Receives Management Award

The Air Command and Control Branch (Code 2336) was selected by the Air Traffic Control Association (ATCA) for their Life Cycle Management Award. Code 2336 provides comprehensive engineering, technical, and logistics support for subsystems that make up the Marine Air Traffic Control and Landing

System. The award recognizes individuals, groups, and organizations that have clearly demonstrated outstanding performance, service, dedication, and contributions to the field of air traffic control. The award was presented at the association's 50th Annual Conference and Exposition in Texas on 1 November to Code 2336 Branch Head David Hebert and his team members: CWO4 Steve Wadase, MSgt Richard Gunn, MSgt Harry Sayers, SSgt Tony Price, Chester Adams, Paul Awes, Richard Cassity, Charles Foster, Ryan Hanson, David Marguccio, Robert Moskol, James Roze, Roger Shweid, Robert Smith, Ray Tejidor, and Ying Wong.

Technical Paper Honored at International Conference

Presented at the Third International Conference on Computing, Communications and Control Technologies (CCCT) held in Austin, TX, in July 2005, a paper authored primarily by Brandon Sights about the Technology Transfer Project, was selected as the best paper of those presented in the session: *Intelligent Hybrid Systems*. The paper was entitled "Integrated Control Strategies Supporting Autonomous Functionalities in Mobile Robots."

Doctoral Dissertation Award

Dr. Kara Sorensen, Marine Mammal Scientific and Veterinary Support Branch (Code 2351), received a first place doctoral dissertation award from the Universities Council on Water Resources in the field of natural sciences and engineering. Her dissertation was one of two 2005 winners from across the country. A graduate of the University of Illinois, Dr. Sorensen is a National Research Council Post Doctoral Fellow working with the Marine Mammal Program. Using a multi-disciplinary approach, Dr. Sorensen's dissertation studied the effect of reduced clay minerals, typically found in soils or aquatic sediment, on the toxicity of pesticides.

CENTER CIVILIAN AWARDS

Lauritsen-Bennett Award

Dr. Roy Axford

For more than 22 years, Dr. Axford has brought outstanding results to Center projects in optical and radio communications, significantly improving the quality of Navy communications through his work in small-aperture and phased-array antennas. He has been a driving force in advancing the quality of standards, specifications, and terminal performance for super high-frequency (SHF) and K, Ka, and Q-band communications. His work has been vital to the success of key programs and systems such as the SHF Shipboard Terminal, the Global Broadcast Service, the Wideband Gapfiller Satellite program, and the Advanced Communications Technology Satellite Mobile Terminal.

Dr. Stephen Russell

Dr. Russell is a pioneer in the excimer laser processing of microelectronic devices and is the co-inventor of a laser technique that demonstrated improved performance and reduced manufacturing costs for the Trident D-5 Star Sensor System. Dr. Russell's expertise in the fields of sensors, microelectronics, materials processing, and novel technologies is evidenced by more than 75 U.S. and foreign patents issued or pending, with more than 25 percent currently licensed. A micro-display technology he co-invented offers improved imaging and video in applications for the warfighter and for police, firefighters, and paramedics.

Executive Director's Award

Mike Reilley was presented the Executive Director's Award on 21 March. Reilley was recognized for his innovative and visionary leadership of Center-wide FORCEnet efforts, and for serving as the Center's lead C^4ISR systems engineer. He was cited for providing visionary leadership and direction for future C^4ISR systems and technology that will be used by U.S. and joint warfighters.

Exemplary Achievement Awards

For sustained performance or specific achievements that merit Center recognition. Recipients included: Charles Adams, Deborrah Ahlgren, Jay Barlis, Lucy Benner, John Bournazos, Rustin Brown, Frank Calantropio, Jim Cheng, Esther Christianson, Kevin Corcoran, Timothy Cornett, Paul Coronado, Phung Dinh, Bruce Dixon, Colleen Dorin, Conrad Dungca, Stephen Feezell, Danny Fields, Bruce Fink, James Fitzgerald, Mitchell Gillette, Mike Gniady, Sharon Goldman, Desiree Gomez, Dennis Grace, Robert Grant, Brian Groarke, Kenneth Hagan, Douglas Hardy, Jack Heckerman, Barry Hensley, Neil Hoff, Walter Horikawa, Frederick Hurban, Richard Irvin, Deana Jaeger, Andy Jung, John Kammerer, Douglas Karr, Chuck Katz, Andy Kho, Melissa Kolberg, Elizabeth Kreigel, Candy Kwiatkowski, Ronald Lambrecht, William Landenberg, Ulderico Loanzon, Robert Lombard, David Lukasik, Robbi Mangra, Brian Matsumo, Carol McDaniel, Rhea McGehee, Sara McMurrey, Christopher McNamara, Celia Metz, Cynthia Nguyen, Tam Nguyen, Wayne Nowitzki, Robert Olds, Alan Olson, John Olson, Kevin Onizuka, Matthew Osburn, Ginger Phillips-Hipp, Nam Phuong, Steven Pucillo, Ayax Ramirez, Willard Rask, James Ritchie, Jay Sakai, Brian Salisbury, James Schmit, Christian Seberino, Jim Senese, Samir Shammas, Paul Sheets, Steven Short, Arleen Simbulan, Robert Smith, Gleason Snashall, Dow Street, Weden Teng, Deborah Tharp, Tine Thompson, Viet Tran, Thomas Tucker, Rob Turner, Paul Valdez, Amy Verity, Paul Michael Vermette, Bruce Wahlen, Dr. Richard Waters, Ann Wyman, and Dr. Mark Xitco.

2005 Secretarial Awards

SSC San Diego presented the 2005 Secretarial Awards at a special ceremony to Vicki Goren, Pam McGregor, Tara Kruger, and Sandy Tapia. Vicki Goren is in the Safety and Environmental Office (Code 2038), Pam McGregor is in the Facilities Management Group (Code 2036), Tara Kruger is the Meteorological and Oceanographic Systems Branch (Code 2642) assistant, and Sandy Tapia is the assistant for the Command, Control, Communications, Computers, and Intelligence Programs, Hawaii (Code 2424).

Science and Technology Recognition Awards

The first Science and Technology Recognition Awards were presented on 23 June to Dr. Richard Waters, Gabe Schmera, Dr. Tom Jones, and Dr. LorRaine Duffy. They were chosen to represent the scientists and engineers at SSC San Diego by the Science and Technology Advisory Committee.

Dr. Richard Waters

Dr. Waters joined the Center's Advanced Integrated Circuits and Sensors Branch (Code 2876) in 1999 as a process engineer for the Integrated Circuit Fabrication Facility. At the Center he has focused on developing novel optical transduction techniques applicable to high-resolution Micro Electro-Mechanical Systems-based sensors. Dr. Waters' work has resulted in a best known transduction of more than 75 milliamperes per nanometer of displacement, which is more than three orders of magnitude better than the previous world's best value for MEMS-based devices.

Gabe Schmera

Schmera joined the Center in 1991. His main area of interest is applications of nonlinear and stochastic analysis to engineering problems. Schmera led the first science and technology dedicated branch in the Intelligence, Surveillance, and Reconnaissance Department (Code 270). His recent projects include developing algorithms for fluctuation-enhanced chemical sensing, specific emitter identification, and knowledge-based radar pulse deinterleavers. His work has resulted in four patent applications (one awarded, three pending) and several publications.

Dr. Thomas E. Jones

Since 2000, Dr. Jones has been co-principal investigator of the Micro Electro-Mechanical Systems (MEMS) Ultra-Sensitive Accelerometer, an Office of Naval Research (ONR)-funded project to develop the world's best MEMS accelerometer. Dr. Jones is also the co-principal investigator and manager of another ONR project to develop an autonomous celestial navigation system using electronic focal plane arrays in the near infrared that will image and identify stars day and night, and provide a precise position fix and absolute azimuth information.

Dr. LorRaine Duffy

At the Center, Dr. Duffy has focused on distributed C^2 tactical decision making under stress. This led her to initiate a program of research on C^2 multi-user virtual environments, culminating in a transitioned collaborative tool, known as Odyssey, in support of the Pacific Command Joint Staff Operations Planning Team. Her work in collaborative technologies has focused on policy formation leading to her current role as the technical warrant officer for FORCEnet collaboration technologies.

2005 Publication Awards

Category 1 – SSC San Diego Technical Reports

Formal, Center-approved publications presenting results of an effort taken by the Center toward an objective defined by a sponsor.

Distinguished

Dr. Glenn Osga, Code 2461
Nancy Campbell, Code 2462
David Kellmeyer, Code 246210
Daniel Lulue, Code 246210
TR 1874, "Design and Evaluation of Warfighter Task Support Methods in a Multi Modal Watchstation"

Wendy Massey, Code 2851
Dr. John Meloling, Code 2851
David Hurdsman, Code 2851
TR 1894, "An S-Band, Low-Pass, Frequency Selective, Surface Radome Design for the LPD-17 Advanced Enclosed Mast/Sensor System"

Category 2 – SSC San Diego Technical Documents (Technical)

Technical materials that do not fall under a technical report series.

Publication of the Year

> Dr. Bela Feher, Code 246205
> Dr. Jeffrey Morrison, Code 246205
> Reynaldo Yturralde, Code 246214
> TD 3168, "Recommendations for Knowledge Desk Configurations for U.S. Navy Fleet Command Centers"

Distinguished

> Dr. Michael Blackburn, Code 2371
> Bart Everett, Code 23705
> Robin Laird, Code 2371
> TD 3141, "After Action Report to the Joint Program Office: Center for the Robotic Assisted Research and Rescue Related Efforts at the World Trade Center"

Category 3 – SSC San Diego Technical Documents (Administrative And Corporate)

Documents covering administrative aspects of the Center's technical work.

Publication of the Year

> Virginia Wallace, Code 21511
> Lee Hood, Code 21511
> Joyce Andrews, Code 21511
> Ed Budzyna, Code 2003
> TD 3155, "SSC San Diego Biennial Review 2003"

Distinguished

> Lee Hood, Code 2112
> Tom LaPuzza, Code 2003
> TD 3105, Rev 1, "SSC San Diego Brief 2002"

Category 4 – Special Documents

Posters, brochures, fact sheets, and all other high-level marketing materials.

Publication of the Year

> Mary Gmitruk, Code 2112
> SD 413, "C^{4}ISR Projects at SSC San Diego"

Distinguished

> Debra Ernst, Code 20093 (contractor)
> Leontine Thompson, Code 2205
> Lisa Benton, Code 2141

Bobby Stacy, Code 2141

Sandra Ernst, Code 2205 (contractor)

Scott Fagergren, Code 21404 (contractor)

SD 467, "Enterprise Resource Planning Guide"

Honorable Mention

John Moore, Code 20383

SD 018, Rev. 2, "Safety and Environmental Management, Emergency Information Flipchart"

Dr. Glenn Osga, Code 2461

"User-Centered Design News (Newsletter)"

Category 5 – Articles in the Open Literature

Articles appearing in academic or professional journals or scholarly books intended to be an original contribution to science or technology.

Publication of the Year

Dr. Wayne Glad, Code 2641

Dr. Carol Becker-Glad, Code 2851

"Long-Lived Photo-Protonated Carbocations from Methyl Anthracenes for Dynamically Tunable Wavelength Filters"

Distinguished

Rachel Goshorn, Code 2373

Dr. Visarath In, Code 2373

David Fogliatti, Code 2373

Dr. Joseph Neff, Code 2373

Yong Kho, Code 2373

Chris Obra, Code 2373

Brian Meadows, Code 2373

Dr. Adi Bulsara, Code 2373

"Nonlinear Dynamics for Fun and Profit"

Honorable Mention

Dr. Allen Shum, Code 2871

"Stochastic Unified Multiple Access Protocol for Link-16"

George Galdorisi, Code 2153

Dr. Glenn Osga, Code 2461

"Human Factors Engineering: An Enabler for Military Transformation Through Effective Integration of Technology and Personnel"

Patrick Moore, Code 2351

"Multiecho Processing by an Echolocating Dolphin"

Category 6 – Articles in Conference Proceedings

Articles published that support an oral presentation given at a recognized conference or symposium.

Publication of the Year

Dr. Marion Ceruti, Code 246206

"States of Matter and States of Information"

Distinguished

Dr. Tom Kaye (retired)

George Galdorisi, Code 2153

"Achieving Information Superiority in Coalition Operations: Seven Imperatives for Success"

CENTER MILITARY AWARDS

Legion of Merit Award

The Legion of Merit Award (Gold Star in lieu of the Second Award) was awarded to Capt. Timothy V. Flynn, USN, who was Commanding Officer of SSC San Diego from April 2002 through August 2005. The award citation recognized Capt. Flynn's exceptional level of leadership, managerial acumen, and command presence as head of a 3,700-person civilian workforce, 75 officer and enlisted component, and $1.3 billion annual operating budget. He was responsible for executing a broad range of highly successful research and development projects in support of Fleet requirements, including the highly visible Chief of Naval Operations mandated rapid fielding of Composeable FORCEnet in the Seventh Fleet Area of Responsibility.

Navy and Marine Corps Commendation Medal

Senior Chief Sonar Technician David N. Levin, USN, received the Navy and Marine Corps Commendation Medal (Gold Star in lieu of Fourth Award) for his meritorious service as Interactive Multi-Sensor Analysis Training Fleet Liaison Officer at the Center from January 2005 through March 2005. His certificate stated that he aggressively assumed responsibility for the threater Anti-Submarine Warfare Composeable FORCEnet capability for naval forces in the Westrn Pacific, greatly improving their operational effectiveness.

Navy League Achievement Award

Chief Electronics Technician (Surface Warfare/Aviation Warfare) Candace Grafe was presented the Military Women of Achievement Award from the Women's Council of the Navy League. Recipients of this award are chosen for their command and community service involvement. Chief Grafe is the fleet support manager in the Tactical Data Links Branch (Code 2643). She has collateral duties as the command's Drug and Alcohol Program advisor, treasurer for the Chief Petty Officers Association, and assistant command fitness leader.

APPENDIX B: CY 2005 PATENT AWARDS

Inventor(s)	Title	Patent No.	Date
Meloling, John Harold Hurdsman, David Earl Massey, Wendy Marie	Method for Making Transmission Measurements in a Dual-Chambered Anechoic Chamber Using Spatial Averaging	6,842,013	11 Jan 05
Ramirez, Ayax D. Russell, Stephen D. Roberts, Mark W.	Broadband Antennas	6,859,189	22 Feb 05
Fogliatti, David W. Meadows, Brian K. Neff, Joseph D. In, Visarath Bulsara, Adi R.	Phase Synchronized Array of Non-Identical Oscillators Using Coupling Network	6,880,400	19 Apr 05
Boss, Pamela A. Lieberman, Stephen H.	Sensor for Performing Surface Enhanced Raman Spectroscopy and Method for Achieving Same	6,888,629	3 May 05
Henry, Willard Ho, Thinh Q. Allen, Kevin Hewett, Charles	Low Observable Multi-Band Antenna System	6,891,514	10 May 05
Warner, James D. Knoebel, Thomas A. Deuth, Joseph R.	Boat Capture System	6,904,861	14 Jun 05
Shimabukuro, Randy L. Russell, Stephen D.	Micro-Power Source	6,911,711	28 Jun 05
Pettit, Ray. H	Simultaneous Frequency and Phase Synchronizer	6,925,136	2 Aug 05
Andrews, John M. Lieberman, Stephen H. He, Li-Ming	Method for Developing a Calibration Algorithm for Quantifying the Hydrocarbon Content of Aqueous Media	6,943,358	13 Sep 05
Boss, Pamela A. Lieberman, Stephen H. Andrews, John M. Anderson Gregory Wayne	Thermo-Electrically Cooled Surface-Enhanced Raman Spectroscopy Sensor System to Detect Volatile Organic Compounds	6,947,132	20 Sep 05

Pettit, Ray H.	Frequency Synchronizer	6,947,504	20 Sep 05
Clayton, Stanley R. Russell, Stephen D. Roser, Mark R. Waters, Richard L.	Wireless Remote Sensor	6,948,388	27 Sep 05
Hansen, Peder M. Phillips, David B. Chavez, Jose L.	High Voltage Bushing	6,951,987	4 Oct 05
Russell, Stephen D. Shimabukuro, Randy L. Offord, Bruce W.	Silicon-on-Sapphire Display Apparatus and Method of Fabricating Same	6,954,235	11 Oct 05
Russell, Stephen D. Shimabukuro, Randy L. Offord, Bruce W.	Silicon-on-Sapphire Display with Wireless Interconnections and Method of Fabricating Same	6,954,236	11 Oct 05
Stein, David W.	Method and System for Detecting Targets Known up to a Simplex from Multi-Spectral and Hyper-Spectral Imagery Employing the Normal Compositional Model	6,958,466	25 Oct 05
Wernli, Robert L. Cowen, Steven J. Held, Jimmy L. Mackelburg, Gerald R. Rosencrantz, Donald M. Braun, Aaron R. Murphy, Gary D.	Submarine Launched Expendable Radio Navigation Buoy System	6,961,657	1 Nov 05
Scheps, Richard	High Resolution Imaging Lidar for Detecting Submerged Objects	6,963,354	8 Nov 05
Boss, Pamela A. Lieberman, Stephen H. Martini, Leonard J. Anderson, Gregory W.	Thermo-Electrically Cooled Surface Enhanced Raman Spectroscopy Sensor System	6,967,717	22 Nov 05
Adams, Richard C.	Ultra-Broadband Antenna Incorporated into a Garment	6,972,725	6 Dec 05
Parks, Bruce Carl	Autonomous Liquid Filled Buoy	6,971,934	6 Dec 05
Lebaric, Jovan E.	Ultra-Wideband Antenna with Wave Driver and Beam Shaper	6,980,168	27 Dec 05

APPENDIX C: CY 2005 DISTINGUISHED VISITORS

January

26   Dr. Dave Skinner
Product Area Director, Littoral Warfare Systems
Naval Surface Warfare Center, Panama City

31   MG John Wood, USA
Director for Joint Experimentation
U.S. Joint Forces Command (J9)

           RADM David Gove, USN
Commander, Submarine Group Seven

February

1   The Honorable John Young
Assistant Secretary of the Navy (Research, Development and Acquisition)

           Dr. Fowler Northrop
Acting Chief Scientist, Information Directorate
Air Force Research Laboratory

11   Dr. Marion Scott
Director, Microsystems Science, Technology, and Components Center
Sandia National Laboratories

22   VADM James McArthur Jr., USN
Commander, Naval Network Warfare Command

23   Dr. Ramesh Rao
Director, San Diego Division
California Institute of Telecommunications and Information Technology/
Professor, Electrical and Computer Engineering
University of California, San Diego

24   BG Stephen Reeves, USA
Program Executive Officer for Chemical and Biological Defense
Office of the Assistant Secretary of the Army (Acquisition, Logistics and
Technology)

March

3   BGEN Paul McCabe
Department of National Defense
Canadian Forces School of Aerospace Studies

           RADM Mark Milliken, USN
Director, Navy International Programs Office

           Mr. Rino Pivirotto
Executive Director, Navy International Programs Office

14	Mr. Jeffrey High Director, Maritime Domain Awareness U.S. Coast Guard Headquarters
	RADM Joe Nimmich, USCG Deputy Chief of Staff, U.S. Coast Guard
16	RDML Raymond Klein, USN Deputy Director, Submarine Warfare Division, N778 Office of the Chief of Naval Operations
23	RDML Jeffrey Lemmons, USN Deputy Commander, Naval Air Forces
28	RDML Stephen Johnson, USN Director, Undersea Technology Naval Sea Systems Command
	RDML William Timme, USN Deputy Commander, Undersea Warfare Naval Sea Systems Command
	Mr. James Thomsen Executive Director, Program Executive Office (Littoral and Mine Warfare)

April

| 27 | Commodore Allan Du Toit, AM
Director, General Navy Capability, Performance and Plans
Royal Australian Navy |

May

5	MAJGEN Charles Simpson, USAF Director, Requirements and Information Directorate (J8) U.S. Joint Forces Command
16	Dr. Robert "Barney" Rubel Director of Wargaming Naval War College
17	VADM Terrence Etnyre, USN Commander, Naval Surface Force, U.S. Pacific Fleet
31	Honorable B. J. Penn Assistant Secretary of the Navy (Installations and Environment)

June

| 2 | Dr. Kirk Evans
Director, Science and Technology
Homeland Security Advanced Research Projects Agency |
| 3 | RADM Thomas Zelibor, USN
Director, Global Operations
U.S. Strategic Command |

17	RADM AnDreas Krause
	Deputy Chief of Staff, Policy, Plans and Operations
	German Ministry of Defense
21	VADM Terry Etnyre, USN
	Commander, Naval Surface Force, U.S. Pacific Fleet

July

5	RADM(s) Michael Miller, USN
	Commander, Carrier Strike Group Seven
	RDML(s) James Symonds, USN
	Commanding Officer, USS *Ronald Reagan* (CVN 76)
6	RADM Robert Murrett, USN
	Director, Naval Intelligence (N2)
	Office of the Chief of Naval Operations
7	BG Michael Cates, USA
	Commanding Officer, Center for Health Promotion and Preventive Medicine
14	VADM Barry Costello, USN
	Commander, Third Fleet

August

4	RDML Joseph Nimmich, USCG
	Director, Maritime Domain Awareness Program Integration Office
8	VADM Barry Costello, USN
	Commander, Third Fleet
18	The Honorable Susan Davis
	Representative, California 49th Congressional District
	U.S. House of Representatives
	RADM Nancy Lescavage, USN
	Director, TRICARE Region West
	RDML Christopher Ames, USN
	Commander, Amphibious Group Three
19	RADM John Donnelly, USN
	Deputy Commander and Chief of Staff, U.S. Pacific Fleet

September

8	RADM Goran Larsbrink
	Director, Strategies and Future Systems
	Defense Material Administration, Sweden
12	Dr. Starnes Walker
	Technical Director/Chief Scientist
	Office of Naval Research
12	Dr. Ramesh Rao
	Director, San Diego Division

California Institute of Telecommunications and Information Technology/
Professor, Electrical and Computer Engineering
University of California, San Diego

13   RDML Jody Breckenridge, USCG
Commander, Maintenance Logistics Command, Pacific

RDML Deborah Loewer, USN
Commander, Mine Warfare Command

14   Mr. Terry Halvorsen
Executive Director, Naval Personnel Development Command/
Chief Information Officer, Manpower, Personnel Training and Education

30   Mr. Jim Patton
Acting Director, Cargo and Transportation Policy
Bureau of Transportation Security

Dr. Kirk Evans
Director, Science and Technology
Homeland Security Advanced Research Projects Agency

October

4   RADM(s) Mark Emerson, USN
Commander, Strike Force Training Pacific

12   Mr. James Thomsen
Executive Director, Program Executive Office (Littoral and Mine Warfare)

31–3 (Nov)   RDML Victor See, Jr., USN
Director, Naval Space Technology Systems Programs/
Commander, Space and Naval Warfare Systems Command Space Field Activity

November

1–4   Mr. Steve Ehrler
Program Executive Officer, Information Technology
Space and Naval Warfare Systems Command

2   RDML Christopher Ames, USN
Commander, Amphibious Group Three

VADM James McArthur, USN
Commander, Naval Network Warfare Command

RDML Robert Reilly, USN
Deputy Chief for C4 Integration and Policy, Office of the Chief of Naval Operations

2–3   RADM James Godwin III, USN
Director, Navy and Marine Corps Intranet (NMCI)
Office of the Assistant Secretary of the Navy

Ms. Linda Newton
Executive Director, Planning and Resources
U.S. Pacific Fleet

9	Commodore Philip Jones, MA, RN Assistant Chief of Staff (Comm and Information Systems), Navy CIS
	RADM Nancy Brown, USN Director, Command and Control Systems / Architecture and Integration (J6) HQ, North American Aerospace Defense Command
22	BG Bengt Andersson, RSN Commander, Maritime Component Command (MCC), Swedish Armed Forces

December

18	Mr. Hugh Montgomery Executive Director, Center for Innovative Technology Institute for Defense and Homeland Security

APPENDIX D: CY 2005 MAJOR CONFERENCES AND MEETINGS

January

3–7	Topsail Principal Investigator Meeting
19–21	The Joint Rapid Architecture Experimentation Meeting
24–25	Submarine Development Squadron 12 Submarine Mine Action Team Meeting
25–27	Specific Emitter Identification Integrated Product Team Meeting
25–30	Commander Operational Test & Evaluation Force Conference

February

1–2	Defense Science &Technology Reliance Information Systems Technology Panel Meeting
7–8	Joint Battle Management Command & Control Alliance Meeting
22	Open Architecture Excomm Meeting
23–24	Information Systems Technology Advisory Committee Meeting
28–1 (Mar)	Dynamic Quarantine of Worms

March

4	Canadian Forces School of Aerospace
15	Homeland Security Summit
16	Security First Corporation Technical Exchange Meeting
17	Wideband Networking Wave Form Integrated Product Team Meeting

April

5–8	The Technical Cooperation Program Maritime Systems Action Group 1 FORCEnet Implications for Coalitions Study Meeting
12–14	Navy Scientific Technical Intelligence Liaison Office Meeting
25–27	Joint-Unmanned Combat Air System Information Assurance Meeting
28	2005 Joint C4ISR Symposium (Classified Session)
	Junior Science & Humanities Symposium

May

5	Joint Forces Command Battle Management Command and Control Alliance Meeting
17–18	6th Littoral Combat Ship Spiral Development Offsite
18	Terminal Fury '04 Information Assurance Brief

June

7–8	Internet Relay Chat Users Conference
9	Nuclear, Command, Control, & Communications Long Term Solution Functional Solutions Analysis Meeting
14	Small Business Innovation Research Phase 1 Kickoff
14–15	Personal Assistants that Learn
28	Mobile Modular Command & Control Meeting
28–29	Ballistic Missile Defense Communications In-Progress Review
29–30	3rd U.S. Navy Airborne Early Warning Ground Integration Segment Space-Based Infrared System Terminal Input Message Meeting

July

5–8	Multi-Service Communications Security Working Group
13–14	Project Fairfield Integrated Product Team Meeting
19–29	Naval Research Advisory Committee Summer Study
27	Hispanic Association of Colleges and Universities

August

2–3	Joint-Unmanned Combat Air System Workshop
2–4	Electronic Key Management System Tier 2/3 Joint Configuration Control Board
24	Matlab/Simulink Technology Seminar
30	International Security & Technology Transfer Review Meeting

September

1	Intelink Conference & Technology Exposition
8	Swedish Senior National Representative Meeting
	Automated Digital Network System/Joint Tactical Radio System Airborne Maritime Fixed Summit
12	California Institute for Telecommunications and Information Technology Workshop
13–14	Mine Warfare Command/Transformational Mine Warfare Conference
21	High Performance Computing Modernization Program User Advisory Group

October

6	Navy Transformational Communications Satellite Meeting
24–26	AUSCANNZUKUS Meeting
25	Air Force Integrator Collaborative Environment Leadership Team Meeting

November

2	C4I Triad Meeting
14–16	U.S. Navy/French Navy DEA Delegation Meeting

December

3–15	Navy Cross Domain Solutions Technical Exchange Meeting
6–8	Joint Tactical Radio System Information Assurance Forum
13–14	Unmanned Systems Capabilities Conference II

APPENDIX E: ACRONYMS

ADS	Advanced Deployable System
AFn	Airborne FORCEnet
ASW	Antisubmarine Warfare
ATS	Automated Test System
AUVSI	Association for Unmanned Vehicle Systems International
BMD	Ballistic Missile Defense
BRAC	Base Closure and Realignment
BTS	Ballistic Missile Defense System Test Bed, San Diego
C^4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
C4SS	Command, Control, Communications, and Computer Systems Support
CDLMS	Common Data Link Management System
CIE	Collaborative Information Environment
CNO	Chief of Naval Operations
CY	Calendar Year
DDG	Guided Missile Destroyer
DISA	Defense Information Systems Agency
DMEA	Defense Micro-Electronics Activity
EHF LBTF	Extremely High Frequency Land Based Test Facility
FY	Fiscal Year
GCCS-M	Global Command and Control System-Maritime
ICFF	Integrated Circuit Fabrication Facility
IED	Improvised Explosive Device
IMAT	Interactive Multisensor Analysis Training
IP	Internet Protocol
IPT	Integrated Product Team
ISR	Intelligence, Surveillance, and Reconnaissance
JAUS	Joint Architecture for Unmanned Systems
JIATF South	Joint Interagency Task Force South
JPEO-CBD	Joint Program Executive Office for Chemical and Biological Defense
JPM	Joint Project Manager
JPM IS	Joint Project Manager for Information Systems
LCS	Littoral Combat Ship

MATCALS	Marine Air Traffic Control and Landing System
MEMS	Micro-Electro-Mechanical Systems
MMS	Marine Mammal System
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NCTSI	Navy Center for Tactical Systems Interoperability
NFCS	Naval Fires Control System
NIPRNET	Non-Secure Internet Protocol Router Network
NMCI	Navy/Marine Corps Intranet
NMES	Navy Marine Corps Enterprise Services
NMMP	Navy Marine Mammal Program
NOAA	National Oceanographic and Atmospheric Agency
OPNAV	Office of the Chief of Naval Operations
PMC	Project Management Council
PMG	Project Management Guide
RDT&E	Research, Development, Test and Evaluation
SAE	Society of Automotive Engineers
SCAMPI	Standard CMMI Appraisal Method for Process Improvement
SIPRNET	Secret Internet Protocol Router Network
SJFHQ	Standing Joint Force Headquarters
SPAWAR	Space and Naval Warfare Systems Command
SSA	Software Support Activity
SSC Norfolk	Space and Naval Warfare Systems Center, Norfolk
SSC San Diego	Space and Naval Warfare Systems Center, San Diego
SYSCOM	Systems Command
TADIL-J	Tactical Digital Information Link-Joint
TASWEX-04	Task Force Antisubmarine Warfare Exercise 2004
UAV	Unmanned Aerial Vehicles
UGV	Unmanned Ground Vehicle
UHF	Ultrahigh Frequency
XTCF	eXtensible Tactical Command, Control, Communications, Computers, and Intelligence Framework

SOURCES/NOTES

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See also *Outlook*, "SSC San Diego Commanding Officer selected for admiral," 8 April 2005, Volume 28, Number 7; *Outlook*, "Capt. Frank Unetic named next Commanding Officer," 6 May 2005, Volume 28, Number 9; *Outlook*, "Capt. Flynn shares farewell thoughts about the Center," 12 August 2005, Volume 28, Number 15; *Outlook*, "San Diego holds Change of Command," 26 August 2005, Volume 28, Number 16; *Outlook*, "New Commanding Officer Capt. Frank Unetic greets all hands," 26 August 2005, Volume 28, Number 16

[2] *Outlook*, "Carmela Keeney named Acting Executive Director," 15 July 2005, Volume 28, Number 14

[3] The Senior Executive Service job announcement for the SSC San Diego, Head of the Intelligence, Surveillance, and Reconnaissance Department, Code 270, opened 12 January 2006. Prior to the announcement, John Audia served as Acting Department Head.

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[5] *Outlook, "Outlook* profiles Gary Wang," 17 June 2005, Volume 28, Number 12

[6] *Outlook*, "BRAC brings together new organization," 16 December 2005, Volume 28, Number 24

[7] Outlook, "FORCEnet alignment continues: Deputy department heads named," 28 January 2005, Volume 28, Number 2

[8] FORCEnet is the operational construct and architectural framework for naval warfare in the information age. The goal of FORCEnet is to integrate warfighters, sensors, command and control, platforms, and weapons into a networked, distributed combat force. See Clark, V. ADM, USN. 2002. "Sea Power 21 Series – Part I: Projecting Decisive Joint Capabilities," *Naval Institute Proceedings*, vol. 128, no. 10, pp. 32–41; Mayo, R. W. VADM, USN and J. Nathman. 2003. "Sea Power 21 Series – Part V: ForceNet: Turning Information into Power," *Naval Institute Proceedings*, vol. 129, no. 2, pp. 42–46.

[9] *Outlook*, "Lightning Bolt Award team establishes RDT&E baseline," 6 May 2005, Volume 28, Number 9

[10] See reference 8 above for a definition of FORCEnet.

[11] *Outlook*, "New Project Management Policy and Guide established," 3 June 2005, Volume 28, Number 11

[12] *Outlook*, "SSC San Diego hosts second annual Technology Days," 3 June 2005, Volume 28, Number 11

[13] SSC San Diego's Composeable FORCEnet model has two primary goals: (1) Deliver a "composeable" framework that allows web-based services and new "plug-and-fight" hardware and software. Composing hardware, software, and services, including sensors and weapons, communications, computing, applications, collaboration, and human–computer interaction components, will create new functional capabilities that meet emerging warfighting requirements. (2) Provide ways to transform information into knowledge that directly supports decision-making at all command levels. Composeable FORCEnet will achieve these goals through a framework design that leverages open, public-distributed web services, specifications, and standards that allow the warfighter to compose map, browser, and temporal views of an operational situation. Composeable FORCEnet will fulfill the FORCEnet vision at a lower cost. See reference 8 above for a definition of FORCEnet.

[14] *Outlook*, "Center participates in Eighth International AUV Competition," 9 September 2005, Volume 28, Number 17

[15] *Outlook*, "Robotics team presents at 2005 High Tech Fair," 8 April 2005, Volume 28, Number 7

[16] *Outlook*, "Summer Intern Program for SWCC enters second year," 16 December 2005, Volume 28, Number 24

[17] *Outlook*, "FORCEnet takes flight," 11 February 2005, Volume 28, Number 3

[18] See reference 8 above for a definition of FORCEnet.

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[20] *Outlook*, "Interactive Multisensor Analysis Training system proves its value to the fleet," 14 January 2005, Volume 28, Number 1

[21] SSC San Diego, Code 230 Weekly Highlights, 6–9 June 2005

[22] See reference 13 above for a definition of Composeable FORCEnet.

[23] *Outlook*, "JIATF South is first CMMI-rated team in SPAWAR," 11 March 2005, Volume 28, Number 5

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[28] *Outlook*, "Technology Transfer Project enhances man-portable robots," 16 December 2005, Volume 28, Number 24

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[36] *Outlook*, "Collaborative Information Environment tool awarded," 26 August 2005, Volume 28, Number 16

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[38] *Outlook*, "Navy Marine Corps Enterprise Services team establishes collaborative environment for Katrina Crisis Action Team," 4 November 2005, Volume 28, Number 21

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[44] *Outlook*, "The USS *City of Corpus Christi* modernization completed," 6 May 2005, Volume 28, Number 9

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[46] *Outlook*, "A WISE solution for legacy military automated test systems," 23 September 2005, Volume 28, Number 18

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